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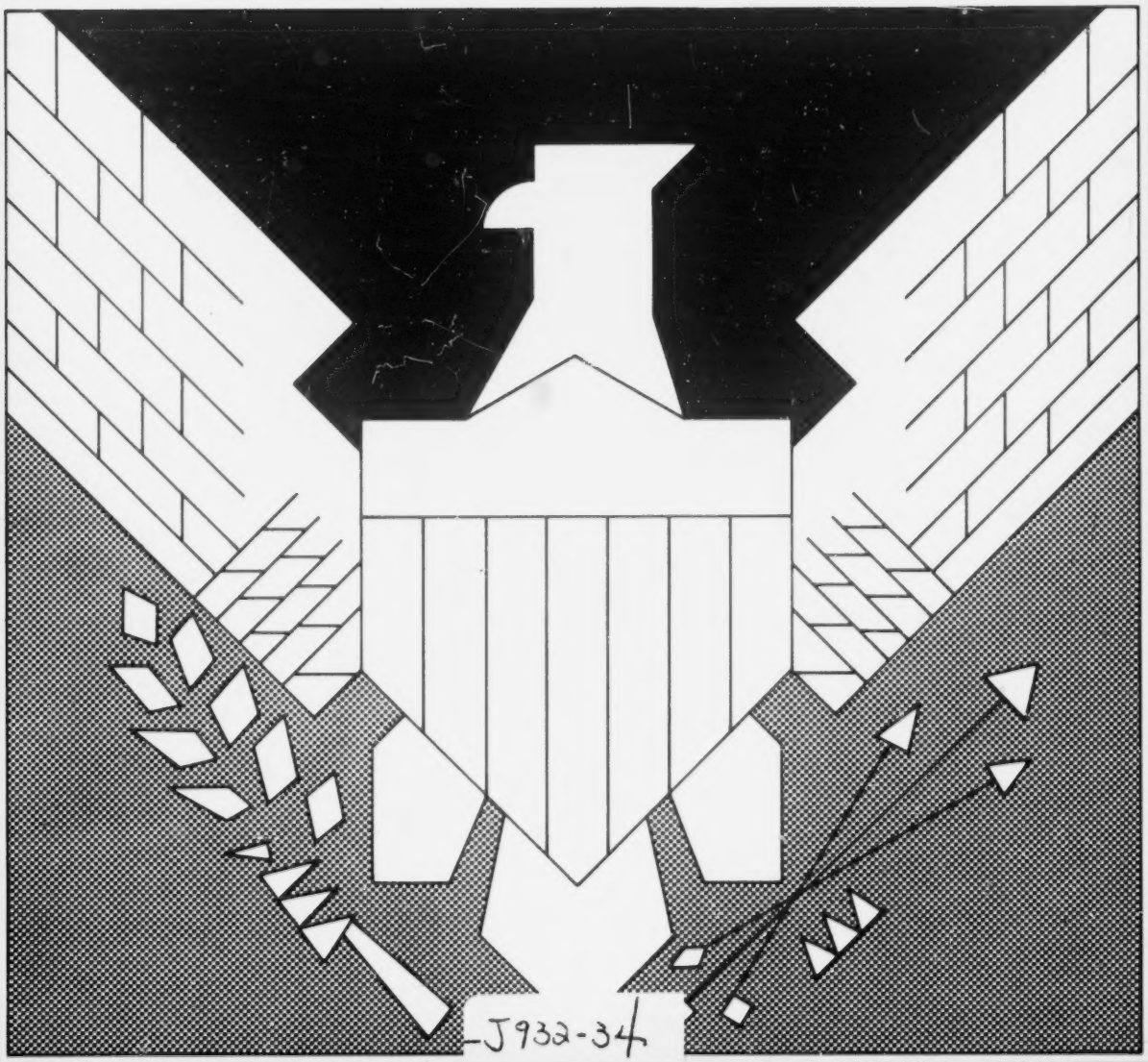
Future Budget Requirements for the 600-Ship Navy



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CBO STUDY

FUTURE BUDGET REQUIREMENTS FOR THE 600-SHIP NAVY

The Congress of the United States
Congressional Budget Office

NOTES

Unless otherwise indicated, all years in this report are fiscal years.

All dollar amounts are expressed in fiscal year 1986 dollars unless otherwise noted.

PREFACE

A key component of the Administration's program to improve U.S. defense capabilities is a buildup of naval forces, which has come to be known by the sobriquet "the 600-ship Navy." In pursuit of this goal, the Navy's budgets, as appropriated by the Congress, have been steadily increased over the Administration's tenure, resulting in growth of about 43 percent from fiscal years 1980 through 1985 (in constant dollars). This analysis, requested by the House Committee on the Budget, reviews progress made to date in the Administration's force buildup and presents some CBO projections of future Department of the Navy budgets that would be required to achieve and to sustain the larger and more modern Navy planned by the Administration. It also examines the effects that lower rates of budget growth would have on the Navy's plans and future force structure and suggests policy options for accommodating smaller budgets. In keeping with CBO's mandate to provide objective and nonpartisan analysis, this study makes no recommendations.

Peter T. Tarpgaard and Robert E. Mechanic of the Congressional Budget Office's National Security Division prepared this study, under the general supervision of Robert F. Hale and John D. Mayer, Jr. Eugene Bryton of CBO's Budget Analysis Division provided valuable assistance in estimating support costs. V. Lane Pierrot and Robert Kornfeld provided vital analytic support, especially in the area of naval aviation, as did John Enns, Ronald Mitchell, and R. William Thomas, all of CBO's National Security Division. The authors gratefully acknowledge the helpful comments of Alfred Fitt and Roberton Williams of the CBO staff and of Professor William W. Kaufman of Harvard University and the Brookings Institution. (The assistance of external reviewers and contributors implies no responsibility for the final product, which rests solely with CBO.) Patricia H. Johnston edited the manuscript, and G. William Darr prepared the manuscript for publication.

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CONTENTS

	SUMMARY	xi
CHAPTER I	INTRODUCTION	1
CHAPTER II	RATIONALE AND PLANS FOR THE 600-SHIP NAVY	3
	The Forward Strategy and Administration's Navy Plans	3
	Future Naval Requirements--Alternative Views	7
CHAPTER III	ADMINISTRATION NAVAL OBJECTIVES: PROGRESS AND PLANS	11
	Force Goals for Navy Ships--Plans Accomplishments, and Outlook	11
	Current Ship Procurement Issues--Decisions that will Shape the Future Navy	16
	Naval Aircraft Programs	27
CHAPTER IV	CBO METHODOLOGY FOR ESTIMATING FUTURE NAVY BUDGET REQUIREMENTS	33
	Investment Costs	33
	Support Costs	38
CHAPTER V	PROJECTIONS OF NAVY BUDGET REQUIREMENTS	45
	Alternative Budget Estimates	45
	Discussion of Results	47

CHAPTER VI	OPTIONS TO ACCOMMODATE LOWER NAVY BUDGETS	51
	The Effects of Lower Budget Growth	51
	Options to Reconcile Navy Plans with Reduced Navy Budgets	53
	Strategy I--Reduce Procurement	53
	Strategy II--Reduce Support Expenditures	57
	Strategy III--Change Force Mix	58
	Conclusion	60
APPENDIX A	DETAILS OF CBO'S ESTIMATES FOR THE NAVY BUDGETS, FISCAL YEARS 1985-2000	65
APPENDIX B	NAVY BUDGETS AND RECENT TRENDS	69

TABLE 1. NAVY OBJECTIVES FOR SURFACE COMBATANTS ALLOCATED TO TACTICAL FUNCTIONS 5

TABLE 2. NAVAL FORCE OBJECTIVES. 6

TABLE 3. PROJECTED FLEET MODERNIZATION STATUS FOR COMBATANTS IN FISCAL YEAR 1989. 15

TABLE 4. PROJECTED FLEET MODERNIZATION STATUS FOR OTHER SHIP TYPES IN FISCAL YEAR 1989 16

TABLE 5. NAVY SHIP ACCESSIONS AND RETIREMENTS OVER FOUR SUCCESSIVE SIX-YEAR PERIODS. 17

TABLE 6. PROJECTED ATTACK SUBMARINE FORCE LEVELS, ASSUMING RETIREMENT AFTER 25 AND 30 YEARS OF SERVICE. 20

TABLE 7. REPLENISHMENT SHIPS: OBJECTIVES AND CURRENT FORCE 26

TABLE 8. NAVY FIVE-YEAR PROCUREMENT PLAN AND BUDGET. 30

TABLE 9. PROJECTED SHORTFALLS/OVERAGES IN COMBAT AIRCRAFT IN 1992 31

TABLE 10. ASSUMED SHIPBUILDING PLAN FOR FUTURE SHIP REQUIREMENTS, FISCAL YEARS 1986-2000. 34

TABLE 11. ASSUMED AIRCRAFT PROCUREMENT, NAVY (APN) PLAN FOR FISCAL YEARS 1986-2000. 36

TABLE 12. DEPARTMENT OF THE NAVY BUDGET SHARES. 39

TABLE 13. CBO METHODOLOGY FOR NAVY BUDGET PROJECTIONS 43

TABLE A-1. NAVY BUDGET PROJECTIONS IN BUDGET AUTHORITY, FISCAL YEARS 1985-2000 CASE I: DEFENSE RESOURCE MODEL AND NO REAL GROWTH IN UNIT PRICES 66

TABLE A-2. NAVY BUDGET PROJECTIONS IN BUDGET AUTHORITY, FISCAL YEARS 1985-2000 CASE II: RESOURCE DYNAMICS MODEL AND 3 PERCENT REAL GROWTH IN UNIT PRICES. 67

TABLE A-3. NAVY BUDGET PROJECTIONS IN BUDGET AUTHORITY, FISCAL YEARS 1985-2000 CASE III: CONSTANT RATIO OF SUPPORT FLEET VALUE AND 3 PERCENT REAL GROWTH IN UNIT PRICES 68

TABLE B-1. DEPARTMENT OF THE NAVY BUDGET SHARES 72

SUMMARY FIGURE	ALTERNATIVE CASES FOR NAVY BUDGET PROJECTIONS	xv
FIGURE 1.	CBO PROJECTIONS OF NAVY BATTLE FORCE SHIPS	14
FIGURE 2.	AGE DISTRIBUTION OF NAVY/MARINE CORPS COMBAT AIRCRAFT, FISCAL YEAR 1985	29
FIGURE 3.	DEPARTMENT OF THE NAVY SUPPORT COSTS--PAST TRENDS AND FUTURE PROJECTIONS	41
FIGURE 4.	RATIO OF TOTAL SUPPORT TO FLEET VALUE	42
FIGURE 5.	OPTION I--NAVY BUDGET PROJECTIONS (Compared with 3 percent growth)	46
FIGURE 6.	OPTION II--NAVY BUDGET PROJECTIONS (Compared with 4 percent growth)	46
FIGURE 7.	OPTION III--NAVY BUDGET PROJECTIONS (Compared with 5 percent growth)	46
FIGURE 8.	INVESTMENT/SUPPORT RATIO FOR THE NAVY	49
FIGURE 9.	NAVY BUDGET--HISTORICAL TREND AND PROJECTED DEFICIENCY FOR ZERO REAL GROWTH VERSUS CASE II REQUIREMENT	52
FIGURE B-1.	NAVY BUDGETS, FISCAL YEARS 1962-1986	71

SUMMARY

When the Administration assumed office in January 1981, it inherited a fleet of about 479 Navy ships, including twelve deployable aircraft carrier battle groups. 1/ Considering this fleet inadequate for U.S. defense needs, the Administration has established higher force goals in almost every ship category, with the objective of building up the total number of battle force ships to 600 by the end of the 1980s. Other key goals are to increase deployable carrier battle groups from 12 to 15 with a comparable increase in the aircraft to fly from these carriers. In addition to increasing numbers, the Administration plans to modernize the Navy with more advanced--and expensive--ships.

Concerns have been raised in the Congress and elsewhere about the costs of attaining and maintaining this "600-ship Navy." Such concerns could be well-founded. From fiscal years 1980 through 1985, the total budget for the Department of the Navy (including the Marine Corps) grew at a real (inflation-adjusted) average annual rate of about 7.5 percent, or from $69.9 billion in 1980 (adjusted for retirement accounting changes) to $100.3 billion in 1985. This study estimates that, over the next decade, the Navy's budget would have to continue to increase at a real rate of between 3 percent and 5 percent a year to meet the Navy's goals. Such sustained real growth would be unprecedented in peacetime and would double the Navy budgets (in constant dollars) between 1980 and 1994. Based on historical precedent and recent Congressional actions to hold down increases in defense spending, this study considers the effects on the Navy of limiting future budget growth.

NAVY'S GOALS FOR SHIPS AND AIRCRAFT

The Navy should meet its 600-ship goal by about the end of this decade. Primarily as a result of completing many of the 100 ships authorized in

1. The 479 total is for "battle forces," that is, ships that participate in or directly support combat operations. In addition, about 60 support ships and older reserve force combatants were in commission in 1981 but were not counted among the battle

earlier years and still under construction when the Administration assumed office, the number of battle force ships has grown from 479 at the end of fiscal year 1980 to 534 as of May 31, 1985. In the meantime, the Administration requested and the Congress provided a series of larger shipbuilding budgets, which together were about 60 percent higher over the 1982-1985 period than those of the preceding Administration. The ships resulting from these authorizations will start to enter the fleet around 1986. The influx of these ships, coupled with an unusually low number of ship retirements projected for the remainder of the 1980s, should enable the Navy to realize the nominal goal of 600 ships in the battle force by the end of the 1980s or early 1990s.

Despite its symbolic importance, however, attainment of a battle force ship count of 600 does not fulfill all the Administration's naval goals. Still higher levels of shipbuilding authorizations would be required to achieve force structure and modernization goals beyond the general objective of 600 ships. These include such specific objectives as obtaining 15 deployable carriers and the modern escorts to accompany them, increasing the number of nuclear attack submarines from 90 to 100, raising amphibious lift capability by 50 percent, and continuing the replacement of retiring ships with modern (and more expensive) versions. It is expected that these goals will require continued real growth in the shipbuilding and conversion (SCN) budget averaging at least 5 percent annually into the mid-1990s.

Realizing plans to increase and to modernize Navy and Marine Corps combat air forces could also present problems. The Navy plans to increase the number of carrier air wings in the active-duty Navy from 12 to 14 to complement the expansion of deployable aircraft carriers to 15. (An air wing consists of 80 to 90 aircraft that operate off an aircraft carrier, but about 50 percent more airplanes per wing are needed to provide for training and support.) The Navy also plans to modernize its air wings according to a new plan that calls for more medium attack aircraft (the A-6) but fewer light attack aircraft (F/A-18) than in the past. The Navy will continue to retain older aircraft, however, and current force plans will result in an average retirement age of 24 years.

In contrast with the 600-ship goal, the Navy probably will not reach its aircraft goals over the next five years. According to CBO analysis of Navy plans submitted in February 1985, by 1992--when all the aircraft purchased over the next five years will be operational--the Navy would still be short

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forces. Usually one more aircraft carrier exists than those that are termed "deployable" carriers, since one normally is undergoing a Service Life Extension Program (SLEP) overhaul and is not available for deployment while in that status.

366 aircraft of nine different types and would have an excess of 239 aircraft of five other kinds. Reaching aircraft force goals would require at least 6 percent real growth in the aircraft procurement accounts in each year through 1990, with sustaining aircraft budgets averaging about 19 percent above the 1985 level thereafter.

FUTURE BUDGET PROJECTIONS

Significant changes in the Navy normally occur only over extended periods of time. Therefore, to gain a true perspective of the cost implications of the kind of force buildup now being pursued by the Administration, it is necessary to make very long-range projections of future budget requirements. This requires a systematic and carefully considered analysis, especially for the procurement and support accounts that constitute most of the Navy's budget. For the procurement accounts, CBO made specific year-by-year estimates of future ship and aircraft acquisition requirements. For fiscal years 1986 through 1990 the published Administration procurement plans were used. For the years beyond 1990, in which the Administration's procurement plans are not published, CBO based its estimates on the numbers of ships and aircraft needed each year to replace retiring units and to achieve and maintain the Administration's planned force level goals. Other investment expenses--for research and development, missiles, torpedoes, munitions, support equipment, Marine Corps equipment, military construction, and so forth--were assumed to retain their recent level of 22.5 percent of the total Department of the Navy budget.

To project support costs--mainly the accounts for operation and maintenance and military personnel--CBO used two different computer models and a ratio-to-fleet-value approach.

Combinations of these projection approaches suggest that future budget requirements will be bracketed by the following illustrative cases:

- **Case I:** Assumes both no real growth in procurement prices and the lower of the support costs projected by the computer models used in this analysis. This results in the minimum projected budget requirement.

- **Case II:** Assumes an average 3 percent annual real growth in procurement unit prices (typical of long-term experience) and the higher of the support costs projected by the computer models used in this analysis. This produces a middle-range projection.

- **Case III:** Assumes an average 3 percent annual real growth in unit procurement prices and support costs that remain at their recent level as a fraction of total fleet (ships plus aircraft) value rather than decline proportionately as they do in Cases I and II. The highest of the three budget projections results from these assumptions.

These three cases produce average annual increases in the total Navy budget ranging from 2.5 percent to 5.1 percent through 1994, as shown in the following table.

Case	Fiscal Years 1985-1994 Annual Real Growth Rate (In percents)	Fiscal Year 1994 Budget Estimate (In billions of fiscal year 1986 dollars)
I	2.5	126.5
II	4.2	144.6
III	5.1	153.1

The increases reflect investment costs that grow between 4.2 percent a year (in Case I) to just over 7.1 percent a year (in Case III), and support costs that also grow though always at a slower rate. By 1995 the projected budgets have a ratio of investment-to-support costs ranging from 1.04 (Case I) to 1.25 (Case II), well above today's level of 0.88 or the 1970s average of 0.73. If the projection of declining support expenditures relative to investment growth is not fully realized, these estimates could understate the actual budgets needed to meet the Navy's current goals.

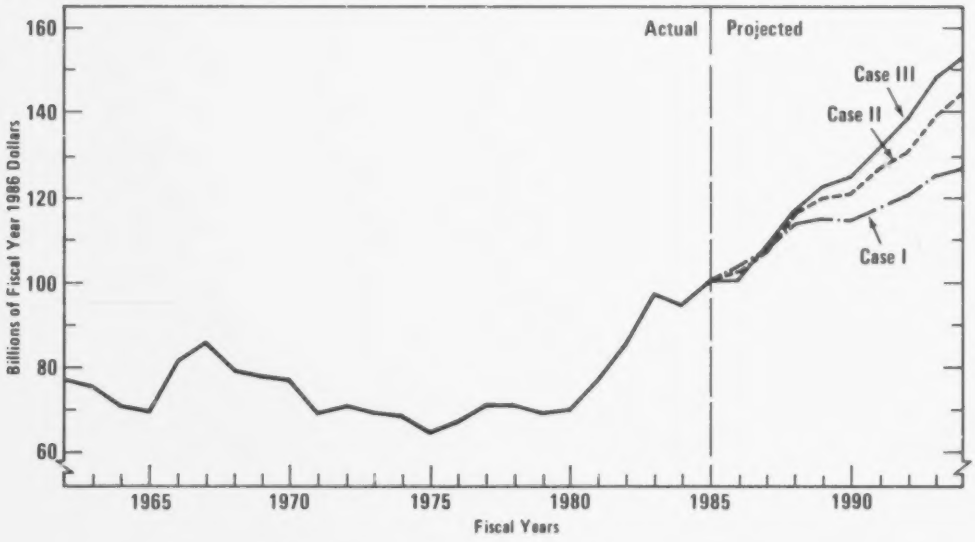
Continued real annual budget growth of 3 percent to 5 percent to the mid-1990s might be difficult to achieve if history is a guide. The Summary Figure plots the projected budget requirements through fiscal year 1994, together with actual appropriations for the Department of the Navy from 1962 through 1985. The Navy budget was remarkably stable (after adjustment for inflation) during the 1960s and 1970s--apart from a modest increase during the Vietnam War years--with no sustained period of real growth exceeding three years during this long period. The results of CBO's analysis, however, indicate a need for continued growth for an additional nine years beyond 1985 to achieve and sustain current naval force objectives. If this should occur, Navy budgets would be about double the 1960s-1970s norm before they begin to level off again in the mid-1990s.

OPTIONS TO ACCOMMODATE LOWER NAVY BUDGETS

In addition to historical precedent, recent Congressional actions suggest that sustained growth might not be achieved. If so, what kind of Navy would result?

Assume, for example, that the Navy budget is held to zero real growth for the next 10 years (fiscal years 1986 through 1995) contrasted with the 4.2 percent real growth of Case II. If this were to occur, a cumulative total of about $250 billion in fiscal year 1986 dollars would be eliminated from the budgets required to implement Navy and Marine Corps programs estimated in Case II. Obviously, cuts of this magnitude would require such a substantial restructuring of the Navy's plans that careful thought should be given to dealing with this contingency. This study suggests three possible strategies to accommodate such changes. These strategies are neither mutually exclusive nor collectively exhaustive, but suggest basic modes of emphasis.

Summary Figure.
Alternative Cases for Navy Budget Projections



SOURCE: Congressional Budget Office.

Strategy I--Cut Investment Resulting in a Smaller or Older Navy

This approach would emphasize cuts in investment to be achieved by accepting a smaller or older Navy. This strategy assumes that 80 percent, or $200 billion, of the reduction would come out of the investment accounts and that each category of investment would be cut in proportion to its projected share from 1986 through 1995. Shipbuilding, then, would be reduced by $61.8 billion, or about 30 percent of the total 10-year shipbuilding budget required to sustain and modernize the 600-ship Navy, as now planned. Assuming a proportional reduction in the number of ships procured, a total of only 151 ships would be authorized contrasted with the 216 CBO estimates would be needed to meet current force goals during the 1986-1995 period. Thus, a fleet totaling about 600 ships in 1990 would settle back to about 535 ships by the end of the 1990s. If, however, the numbers of new auxiliary and support ships were reduced more than proportionately in order to protect the procurement of more expensive combatants, then the reduction in numbers of ships would be still higher. Zero real growth for a period of 10 years, therefore, could result in a fleet numbering about 60 to 80 fewer ships than now planned by the end of the century.

Aircraft procurement would be similarly affected. A reduction of $51.0 billion over the 10-year period would result in the procurement of about 2,000 aircraft (again, assuming a proportionate reduction) compared with the 3,000 estimated by CBO as necessary to realize current force goals. This reduction of about 1,000 aircraft (as well as proportionate reductions in aircraft rework, spares, and support equipment) would clearly have a substantial impact on the structure and capabilities of the Navy and Marine Corps tactical air forces. Moreover, the reduction could be even larger if fewer purchases raised the unit cost of aircraft.

The effect of such procurement reductions on the numbers of ships and aircraft in the fleet might be mitigated by keeping older ships and aircraft in the fleet longer than current practice. This expedient could maintain the numerical size of the fleet at higher levels but would not, of course, achieve fleet modernization. The Navy has repeatedly stressed the need for modern, highly capable ships and aircraft to counter the threat posed by potential enemies. Maintaining force levels with units that are still older than the 30- to 45-year service lives assumed in this study would be at best only a partial solution and might, in fact, serve to increase operating costs while obscuring real deficiencies in fleet capabilities.

Strategy II--Reduce Support Expenditures

This strategy, which would lower support budgets, has major drawbacks. First, it is inconsistent with defense priorities expressed in recent Ad-

ministration and Congressional statements. Second, it is unlikely that the support accounts alone could provide enough spending reductions to accommodate budget deficiencies of the magnitude assumed under zero real growth. Even if all growth in the support budgets since 1980--except that which offset inflation--was removed and no further growth was allowed, only about $186 billion of the projected $250 billion shortfall would be eliminated. Yet in 1980, when the fleet was smaller, support budgets were almost unanimously believed to be inadequate. Cuts in support funding, therefore, could contribute to making up budget shortfalls; but, except in cases of relatively modest deficiencies, they probably could not carry the full burden.

Strategy III--Procure Less Expensive Ships

Strategy III would absorb most of the budget deficiencies in the investment accounts, but would mitigate the impact on procurement quantities by developing less expensive alternatives to some of the high-cost ships, aircraft, and weapons prominent in current procurement plans. If one believes, as some do, that a large fraction of the cost of modern military systems is spent extracting a small extra margin of performance from complex technology, then this approach might be attractive. An illustrative example of this approach is contained in the CBO report, *Building a 600-Ship Navy: Costs, Timing, and Alternative Approaches*, published in March 1982. That report examined alternative 10-year shipbuilding programs in detail and found that incorporating lower-cost ships could produce savings of over $70 billion (in fiscal year 1986 dollars) over the 10-year period while providing the same number of ships. The principal types of new ships suggested were a lower-cost guided missile destroyer, a cruiser carrying vertical/short take-off and landing (V/STOL) aircraft, and a diesel-electric submarine. If shipbuilding savings of $70 billion could be achieved, it would be more than enough to offset the expected deficiencies in the shipbuilding budget that would result from zero real growth. If lower-cost ships and aircraft are to be a true option for the Navy, however, then fully engineered designs for such alternatives would have to be developed. Without such designs, this strategy could not be implemented.

CONCLUSION

There are no easy answers to the problems that would be created by budget growth falling considerably short of that required to accomplish the Navy's current objectives. Compromises would have to be made in force levels, readiness, or unit capability or, especially in the case of larger budget shortfalls, all of these. Accommodation to such budget deficiencies would be more efficient if a strategy were developed well in advance.

In view of the long periods of time and the enormous commitment of resources necessary to develop a modern Navy, naval planners and the Congress must maintain a clear view of the long-term budget realities of naval force plans. If there is likely to be a significant difference between the funding required to realize naval force objectives and the funds actually provided, then an agreed upon strategy for dealing with such shortfalls would contribute to a clearer understanding by all concerned of the likely results of any budgetary trend.

CHAPTER I

INTRODUCTION

Over the past two decades, the once overwhelming dominance of the U.S. Navy has been eroded by a sustained buildup in Soviet naval power. During this period, the Soviet Navy has evolved from a modest coastal defense force to a modern oceangoing fleet capable of projecting power throughout the world.

Citing these developments as a prime example of a dangerous decline in U.S. military power, the Reagan Administration vowed to reverse this trend. It set as its overall naval objective the reestablishment of clear U.S. maritime superiority by the end of this decade. In pursuit of this goal, the Administration has increased the Navy's budget authority by 43 percent (in constant dollars and adjusted for recent accounting changes) from fiscal year 1980 through fiscal year 1985. (The Navy's budget also includes funding for the U.S. Marine Corps.)

A specific Administration objective is to build up to a 600-ship fleet, which would include 15 carrier battle groups. This "600-ship Navy" objective has become a symbol and catchword for the Administration's program, a surrogate for the real objective which is, to use the Administration's term, "maritime superiority." This is, perhaps, unfortunate since the Administration's program is much broader than simply achieving a ship count of 600. The fleet expansion denoted by the 600-ship Navy term is, nevertheless, an important aspect of the program and the ramifications that this expansion holds for Navy personnel and support requirements must be examined along with procurement costs.

In March 1982, CBO published a report entitled *Building a 600-Ship Navy: Costs, Timing, and Alternative Approaches* that examined the overall cost implications of the naval force expansion in the context not only of numerical force goals but also of force quality and modernization goals. This report was followed by subsequent reports entitled *Costs of Expanding and Modernizing the Navy's Carrier-Based Air Forces* (May 1982) and *Manpower for a 600-Ship Navy: Costs and Policy Alternatives* (August 1983) that focused on the aircraft and manpower implications, respectively, of the Administration's proposed force expansion.

This report revisits some of the issues examined in those earlier studies, updating the analysis in light of subsequent events. It also reviews recent Navy budget trends and provides projections of future budget requirements to the end of the century. Particular attention is paid to an analysis of the investment and support costs associated with the larger fleet projected for the immediate future. All of this should provide a perspective on the current Navy budget in terms of past experience and future prospects.

CHAPTER II

RATIONALE AND PLANS FOR THE 600-SHIP NAVY

Soon after taking office in 1981, the Reagan Administration put forward specific recommendations for the number and kinds of ships that would be required to perform the Navy's missions. These recommendations derive from a strategy articulated by the Secretary of the Navy to meet the challenge posed by the growing Soviet fleet. This concept, sometimes called the "Forward Strategy," is controversial, however, and some observers believe that, after spending hundreds of billions of dollars, the United States may have a Navy ill-suited to the tasks that it is most likely to face.

THE FORWARD STRATEGY AND ADMINISTRATION'S NAVY PLANS

Navy force planning today is premised on a forward offensive strategy that would have the Navy move aggressively into enemy waters early in a war to strike enemy naval forces and their supporting base structure. The primary instrument of these strikes would be carrier battle groups, consisting of one or more aircraft carriers and their support escorts. The battle groups, employing costly "battle-group-capable" ships, would thus establish naval superiority and create a more benign environment at sea in which less capable warships could operate effectively. The Administration believes that even the existence of such offensive forces would force the Soviet Union into a defensive, reactive position, allowing the United States to capitalize on Soviet geographic disadvantages, and compelling the USSR to concentrate its naval forces close to home where they would pose less of a threat to U.S. sea lines of communication.

The carrier battle group, therefore, is the key structural element in naval force planning. A basic battle group consists of an aircraft carrier, its air wing (about 80 to 90 aircraft), and about six escorting cruisers and destroyers. In actual combat in high-threat areas, a battle group would probably include two or more aircraft carriers to provide mutual support and protection along with more striking power, thus enhancing the prospects for success. The ratio of escorting ships to aircraft carriers in such an enlarged battle group would remain about six to one.

Such a battle group is a formidable aggregation of tactical power and would be a prime target for the enemy, especially if it were approaching his

shores. The current concept for defending the battle group against enemy counterattack is a defense in depth, or a layered defense. Escorts and defending aircraft would be arrayed in multiple rings around the carriers. Enemy aircraft and cruise missiles would first be engaged by defending fighters in the "outer air battle." Surviving enemy attackers would then be engaged by cruisers and destroyers in the inner screening forces. These cruisers and destroyers, as projected in the Navy's plans, would all be equipped with the sophisticated AEGIS anti-air-warfare defense system. 1/ Last-ditch protection would come from point defense systems, such as the Sea Sparrow missile system and Phalanx, a radar-directed Gatling gun, mounted on individual ships. Attacking enemy submarines would, similarly, have to penetrate an outer screen manned by anti-submarine warfare (ASW) destroyers, U.S. nuclear submarines, and carrier-based ASW aircraft. An inner screen of destroyers, equipped with powerful active ("pinging") sonars, would attempt to intercept any surviving enemy submarines trying to close with the carriers. Thus, the battle group would hope to protect itself through withering attrition against any attacking forces.

To provide this protection, a nominal two-carrier battle group, as defined in the Navy's plans, would include 12 escort ships--three CG-47-class cruisers, five DDG-51-class destroyers, and four DD-963-class destroyers. In addition, the battle group would contain a fast combat support ship (AOE) which, in turn, would be supported by an underway replenishment (UNREP) group consisting of a fleet oiler (AO), an ammunition ship (AE), and a combat store ship (AFS), all protected by the UNREP group escorts--one DDG-51-class destroyer and three frigates.

To supplement the carrier battle groups, the Navy plans to form four surface action groups (SAGs)--battle groups that do not contain aircraft carriers. They are, instead, to be centered on the four recommissioned Iowa-class battleships and will include one CG-47-class cruiser and three DDG-51-class destroyers for each SAG. These surface action groups can be used in addition to, or instead of, carrier battle groups to project a U.S. tactical naval presence wherever it may be needed.

In addition, the Administration plans to increase the Navy's amphibious lift capability by half. In 1980, the Navy's amphibious ships (those capable of landing Marines on a hostile shore) could carry about one Marine Am-

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1. The AEGIS weapon system, which is now being deployed on the USS Ticonderoga (CG-47) class cruisers after a development period spanning 20 years, employs the Navy's most powerful radar and has a capability to track more targets than any other ship-based system. It is also quite expensive, with each AEGIS ship costing over $1 billion.

TABLE 1. NAVY OBJECTIVE FOR SURFACE COMBATANTS ALLOCATED TO TACTICAL FUNCTIONS a/

Force Types	BB	CGN	CG-47	DDG-51	DDG-993	DD-963	FF/FFG
15 Carrier Battle Groups	--	6	23	31	--	30	--
4 Surface Action Groups	4	--	4	12	--	--	--
Amphibious Force (1.5 MAF) b/	--	--	--	10	4	--	8
10 Underway Replenishment Groups	--	--	--	10	--	--	30
7 Convoys	--	--	--	--	--	7	63
Total	4	6	27	63	4	37	101

SOURCE: Congressional Budget Office, based on Department of the Navy data.

a. BB = battleship; CGN = nuclear-powered guided missile cruiser; CG = guided missile cruiser; DDG and DD = destroyers; FF/FFG = frigates.

b. A MAF is a Marine Amphibious Force consisting of 32,500 troops.

phibious Force (MAF)--about 32,500 troops and their associated equipment. The Administration plans to increase this capacity to about 1.5 MAF while modernizing the ships in the force. 2/ Current plans are to build a total of 10 or 11 multipurpose amphibious assault ships (LHD-1 class), costing over $1 billion each, and to maintain production of the smaller and less expensive landing ship dock (LSD-41 class) at the rate of two per year. The increase to 1.5 MAF is intended to enable the United States to undertake a major amphibious operation in one theatre and react simultaneously to a lesser contingency elsewhere. The Navy plans to protect these amphibious ships with a force of 14 modern destroyers and 8 frigates.

Additional destroyers and frigates also are needed as escorts for underway replenishment groups (URGs) and convoys. Navy plans call for 10 destroyers and 30 frigates to protect URGs, and a total of 7 destroyers and 63 frigates to serve as convoy escorts.

Table 1 summarizes the Administration's goals for surface combatant forces. In addition, the Administration's plans include 100 nuclear-powered

2. One-half of a MAF is called a Marine Amphibious Brigade (MAB).

attack submarines and 31 modern mine warfare ships. A summary of the Administration's overall force level objectives for naval ships and the inventory actually on hand as of May 31, 1985 is displayed in Table 2.

TABLE 2. NAVAL FORCE OBJECTIVES

Ship Type	Number of Ships	
	Objective	Current Force a/
Aircraft Carriers	15	13
Battleships	4	2
Battle Group Escorts	137	98
Frigates	101	108
Attack Submarines	100	98
Small Combatants	--	6
Total, Combatants	357	325
Amphibious Ships	75 b/	62 c/
Mine Warfare Ships	31	3
Replenishment Ships	69	53
Material Support Ships	27	25
Fleet Support Ships	33	29
Total, Other Ships	235	172
Strategic Submarine Force (SSBNs) d/	Unstated	37
Total All Ships	600+	534

SOURCE: Congressional Budget Office, based on Department of the Navy data.

a. As of May 31, 1985.

b. Total lift capacity must be sufficient to support 1.5 Marine Amphibious Forces (MAF). Each MAF contains 32,500 troops.

c. The current force supports one MAF.

d. These submarines carry nuclear missiles.

FUTURE NAVAL REQUIREMENTS--ALTERNATIVE VIEWS

The Administration's plans for naval force expansion are derived from its forward offensive strategy. This concept of operations, though appealing to many, poses certain risks--in the strategy of forward offensive operations early in the war, in the tactics assumed for protecting the battle group, and, perhaps most important, in the force structure toward which the Navy is driven by this planning scenario.

The forward offensive strategy would require some extraordinarily hazardous operations. In a recent article, Admiral Stansfield Turner and Captain George Thibault pointed out some of these hazards and concluded that thoughtful military planners were unlikely to undertake such operations. 3/ Given modern surveillance techniques and current battle group operating procedures, a battle group approaching Soviet waters would be detected long before it arrived within striking distance of Soviet bases. Admiral Turner and Captain Thibault calculate that a battle group would be exposed to intensive attack by missile-launching bombers, surface warships, and submarines for at least two full days before reaching its attack range. Even assuming that the battle group survived and attacks were launched, the USSR would have had ample time to disperse their forces away from the U.S. attack. No president, Admiral Turner and Captain Thibault conclude, could possibly permit the Navy to undertake such a high-risk effort with so little prospect for positive results.

Even with the assumption that the battle group's defenses could be made nearly airtight against conventional attack (an assumption that is by no means justified at this time), it still would be necessary to consider the threat of nuclear weapons. A concentrated battle group is probably the world's most tempting target for a tactical nuclear weapon. Not only would tactical nuclear weapons offer a high probability of success in destroying or disabling a battle group, but the use of nuclear weapons at sea would also involve relatively little danger of unintended collateral damage. Thus the approach of a battle group in Soviet waters in the early stages of a superpower military confrontation could result in the sudden destruction of major U.S. naval forces and could be the stimulus for initiating an exchange of nuclear weapons.

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3. Stansfield Turner and George Thibault, "Preparing for the Unexpected: The Need for New Military Strategy," *Foreign Affairs* (Fall 1982), pp. 122-135. Admiral Turner was Commander-in-Chief, Allied Forces, Southern Europe, and President of the Naval War College. He served as Director of Central Intelligence from 1977 to 1981. Captain Thibault, USN, is Chairman of the Department of Military Strategy at the National War College.

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In addition to Admiral Turner, another experienced naval officer, Admiral Elmo R. Zumwalt, a former Chief of Naval Operations, thinks that the battle group concept is becoming increasingly invalid. 4/ He believes that, under this concept, the offensive power of the Navy is being overly concentrated in a few ships, necessitating the expenditure of additional billions of dollars in highly complex, defensive missile systems to protect them. Insufficient effort is being made, Admiral Zumwalt believes, to disperse and diversify the Navy's strike capability through newer concepts based on long-range cruise missiles, vertical and short take-off and landing (V/STOL) aircraft, space surveillance, and new hull types available from modern technology. Admiral Zumwalt is disappointed that the Reagan Administration has elected to go for more of the same when, he feels, new directions are needed.

Both Admiral Turner and Admiral Zumwalt believe that modern naval strategy and force structure should be based on a concept of "distributed force"--that is, forces should be distributed geographically in such a way that success does not depend on one large tactical unit, such as a carrier battle group. Rather, units should be distributed to confuse the enemy's targeting and to prevent him from massing his attacking force against one all-important target.

This strategy, however, would require a force structure--ships and weapons--substantially different from that currently planned for the 600-ship Navy. A distributed force concept, in which ships would normally operate under electromagnetic and acoustic silence, would require much less emphasis on powerful active systems, such as AEGIS and the high-power SQS-53 sonar, and instead, place more emphasis on passive systems--airborne surveillance (including V/STOL) and command, control, and communications (C3) systems--suitable to distributed force operations.

The Administration, however, continues to advocate an aggressive approach to naval warfare. Secretary of the Navy John Lehman has stated: "... seizing the initiative is essential. We have to move up north of the GIUK (Greenland, Iceland, United Kingdom) gap. We have to control the Norwegian Sea and force them back into the defensive further north, under the ice, to use their attack subs to protect the Kola and Murmansk coasts, and similarly their Pacific coast as well." 5/

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4. Admiral Elmo R. Zumwalt, USN (Retired), "Naval Battles We Could Lose," *International Security Review* (Summer 1981), pp. 139-56.

5. *Department of Defense Authorization for Appropriations for Fiscal Year 1985*, hearings before the Subcommittee on Sea Power and Force Projection of the Senate Committee on Armed Services, 98:2 (1984), pt. 8, p. 3870.

This approach has important implications for the structure and ultimate affordability of future U.S. naval forces. Although the Navy expects to reach its numerical goal of 600 ships by the end of fiscal year 1989, the task of modernizing the fleet will require considerably more time and money. An earlier CBO analysis indicated that a 10-year program to achieve the Navy's force goals for ships--including modernization as well as the numerical goals--would require 10 years of annual shipbuilding budgets averaging more than $21 billion (in fiscal year 1983 dollars). 6/ This is considerably more than the average yearly shipbuilding budgets (also stated in fiscal year 1983 dollars) of $7.2 billion in the Carter Administration, $6.8 billion in the Nixon and Ford Administrations, or the $11.7 billion to date of the Reagan Administration. In that same study, CBO estimated that a program to produce the same number of ships, but with the mix of ship types tailored more toward distributed force operations, could reduce the 10-year procurement cost of the Navy's force buildup and modernization by about $60 billion (in fiscal year 1983 dollars), or about 28 percent. Thus the choice of ship types and force structure has important budgetary as well as strategic implications.

Despite the substantial procurement costs, the Administration is adhering to the basic plan established early in its tenure for expanding and modernizing U.S. naval forces. The program is, however, proceeding at a slower pace with each succeeding five-year procurement plan for ships and aircraft.

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6. Congressional Budget Office, *Building a 600-Ship Navy: Costs, Timing, and Alternative Approaches* (March 1982).

CHAPTER III

ADMINISTRATION NAVAL OBJECTIVES: PROGRESS AND PLANS

In testimony before the Congress and in public statements, the Administration has outlined in some detail its plans for building up U.S. naval strength. Some major objectives included in these plans are:

- Increase the number of battle force ships to 600;
- Raise the number of deployable carrier battle groups from 12 to 15;
- Increase the number of active carrier air wings from 12 to 14;
- Enlarge the number of nuclear-powered attack submarines to 100;
- Expand amphibious lift capability by about 50 percent; and
- Modernize the force with new ships and aircraft designed to meet the threat posed by the capabilities of potential enemies.

In order to accomplish these and other objectives, the Administration requested (and the Congress approved) a series of sharp Navy budget increases during its first term. The Department of the Navy budget appropriated for fiscal year 1985 ($100.3 billion) was fully 43 percent (in dollars of constant purchasing power) above that of fiscal year 1980. With this increase in resources, some progress already has been realized in meeting the Administration's goals, and more will come in the future as a result of funds already appropriated.

FORCE GOALS FOR NAVY SHIPS--PLANS, ACCOMPLISHMENTS, AND OUTLOOK

The capabilities of the Navy depend not only on the number of ships in the fleet but also on the kinds of ships it includes. The current status and future outlook for the U.S. Navy in these areas are discussed below.

Numerical Force Goals

Although a simple count of the number of ships in the fleet is clearly an inadequate indication of overall naval strength, the term "600-ship Navy"

has become the catchword for the Administration's plan to increase U.S. naval strength. For this reason, achieving a ship count of 600 has assumed great symbolic value and the Secretary of the Navy has stated on numerous occasions that it would be reached by the end of fiscal year 1989.

When the Reagan Administration took office in January 1981, the fleet numbered 538 ships, counting all active, reserve, and civilian-manned ships owned by the Navy. Some of these ships, however, were not considered sufficiently important by the Administration to be included against the 600-ship goal and the inventory of ships that "counted" was assessed at 479. The Navy's inventory of ships (using the Reagan Administration's counting rules) had been about 1,000 as recently as 1968, but fell steadily throughout the Nixon and Ford Administrations as World War II era ships were retired. The ship count bottomed at about 468 during the Carter Administration and had begun to climb as President Reagan took office. By the end of fiscal year 1984, the Navy's inventory of ships had grown to 523. All but five of the additional ships added to the fleet during this period, however, were authorized in previous Administrations.

Because of the substantial period of time required to build new warships, very few ships authorized during the Reagan Administration will arrive in the fleet before fiscal year 1986, by which time the fleet will have grown to about 550 ships. Growth of the fleet to this level, therefore, was accomplished by earlier Administrations. Further growth to 600 ships, if it occurs, will be the achievement of the current Administration. To this end, the Reagan Administration requested $61.7 billion, and the Congress appropriated $53.5 billion (in fiscal year 1986 dollars), for shipbuilding and conversion (SCN) from fiscal years 1982 through 1985. This four-year authorization total was 47 percent higher than that of the previous Administration, but it produced only a 13 percent increase in the number of new ships authorized, reflecting an emphasis on procurement of more sophisticated and expensive ships. 1/

The Navy plans to reach a count of 600 ships in the "battle forces" by the end of fiscal year 1989. 2/ Because the details of such projections are

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1. In addition to the 13 percent increase in the number of new ship authorizations (69 in fiscal years 1982-1985 versus 61 in fiscal years 1978-1981), there have also been 22 conversions/reactivations/acquisitions in the 1982-1985 period compared with only two in the 1978-1981 period.

2. The term battle forces is used by the Administration to denote those ships that are included by the counting rules as opposed to certain older ships and miscellaneous support ships that are not counted in the battle force level. These additional ships numbered 56 as of the end of fiscal year 1984.

seldom released in unclassified form, CBO makes independent projections based on unclassified data. CBO's projections indicate that the Navy will reach 600 ships, but at a later time. In preparing its projections, CBO makes certain assumptions about the operating life of various ship types--namely, that combatants, amphibious, and mine warfare ships will remain in the fleet for 30 years, auxiliary and support ships for 40 years, aircraft carriers for 45 years, and battleships for 20 years after reactivation. Using these assumptions and recent estimates of delivery dates for ships currently under construction, the CBO projection of battle force ship levels should approximate Navy force plans. But, unlike the Administration's estimates, CBO projects a force level of only 573 ships at the end of 1989, with 600 ships attained during 1992. This discrepancy between Navy and CBO projections occurs primarily because of differences in projected ship retirements, with the Navy apparently planning to retain about 27 ships beyond the 30- or 40-year retirement assumptions made by CBO. There is, however, no absolute necessity for retiring ships at the 30- or 40-year point or, indeed, for keeping them that long. Retirement decisions must consider such fundamentals as the condition of the ship and the prospect for its continued usefulness in the fleet. The 30- and 40-year thresholds are typical of current retirement practice, however, and serve as a fairly reliable benchmark for assessing candidates for retirement. Ships beyond these ages are clearly very old.

The annotations in Figure 1 show force growth attributable to ships authorized prior to the current Administration--that is, those entering the fleet through fiscal year 1985--and those authorized or planned by the current Administration, which would enter the fleet during the subsequent eight years. Also indicated are those ships currently authorized (to be delivered through 1989), those resulting from the Administration's Five-Year Shipbuilding Plan as submitted in February 1985 (delivered in 1990 through 1994), and ships resulting from CBO's shipbuilding projections (delivered in 1995 and beyond). Thus ship deliveries through the end of the 1980s are already determined, and ships to be delivered in the first half of the 1990s are the subject of the current Five-Year Shipbuilding Plan.

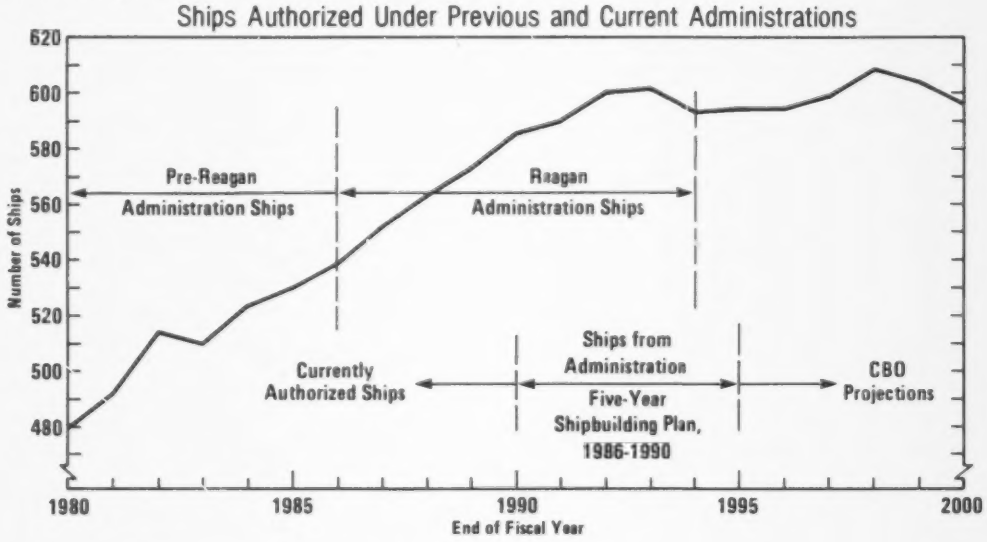
Fleet Modernization

Although the force level goal of 600 ships has received the most public notice, another goal of Administration naval planners--force modernization--is at least equally important. In this area, however, much more remains to be accomplished. It will, consequently, take substantially more time and money to continue force modernization even after the 600-ship goal is reached.

Displayed in Table 3 are the Navy's force goals for various types of combatants compared with the numbers of modern and earlier ships projected by CBO to be in the fleet in 1989, the year the Navy expects to reach 600 ships. In the category of "modern ships," CBO included those ship classes designed and built after 1970. Nearly all of the ships in the "earlier classes" category will be 20 or more years old by 1989. This projection indicates that, although the Navy may meet its numerical force goals, only 45 percent of general purpose combatants (excluding aircraft carriers) will be in the modern category in 1989.

The most acute deficiency will occur in the guided missile destroyer (DDG) type, in which only five ships of the 67-ship objective will be modern. To reduce this deficiency, the Navy plans to procure 29 Arleigh Burke (DDG-51) class guided missile destroyers, only one of which will be delivered by 1989. These ships are expected to have an average cost of about $800 million each (in fiscal year 1986 dollars). Even if all 29 ships are eventually procured, 34 additional modern DDGs will still be needed to reach the Navy's force objective. Assuming the average price of the DDG-51 class ship is held to $800 million, the cost of the 29-ship procurement would be $23.2 billion. The additional 34 ships would cost $27.2 billion even if there

Figure 1.
CBO Projections of Navy Battle Force Ships



SOURCE: Congressional Budget Office, based on Navy Department data.

TABLE 3. PROJECTED FLEET MODERNIZATION STATUS FOR COMBATANTS IN FISCAL YEAR 1989 (In number of ships)

Ship Type	Force Objective a/	Available 1989	
		Modern Ships b/	Earlier Classes
Cruisers (CG)	27	15	18
Destroyers (DDG)	67	5	32
Destroyers (DD)	37	31	0
Frigates (FFG/FF)	101	51	65
Submarines (SSN)	100	47	59
Total	332	149	174
Percent of Objective	--	45	--

SOURCE: Congressional Budget Office.

a. Testimony of Vice Admiral Robert L. Walters before the Seapower and Strategic and Critical Materials Subcommittee of the House Committee on Armed Services, March 4, 1982.

b. "Modern" means ships in classes substantially designed and built after 1970, which include: CG-47, DDG-51, DDG-993, DD-963, FFG-7, and SSN-688.

is no real growth in the price of DDGs. Thus the cost of the DDGs alone needed to modernize the force after 1989 would total over $50 billion (all in fiscal year 1986 dollars).

In other categories of ships, as shown in Table 4, modernization needs will also be extensive. Among underway replenishment ships, only about 27 percent will be modern (as defined above) in 1989; in the amphibious ship category, about 21 percent will meet this classification. In the long-neglected category of mine warfare ships, all ships in the fleet in 1989 will be modern, although present plans call for a force goal of only 31 ships of this type, compared with the force of about 85 mine warfare ships maintained in the 1960s. 3/

3. The current force of mine warfare ships is, however, augmented by 2 squadrons of mine sweeping helicopters containing 11 aircraft each.

Fleet modernization will be a continuing problem for the Navy even with generous budgets. There has been a long-term trend toward keeping ships in the fleet longer as replacement ships have grown more expensive, as shown by the data displayed in Table 5. In the successive six-year periods shown, the number of ships retired decreases markedly over time and would total only 26 ships in the 1984 through 1989 period if the 600-ship goal is to be reached by 1989. During the same period, the age of retiring ships has increased steadily and this trend is expected to continue. (The average age for the 1984 through 1989 period cannot be computed yet, because the identity of the actual ships to be retired in the future are not available to CBO.) The data in Table 5 show that recent growth in the number of ships in the fleet and the growth projected for the immediate future is not so much the result of more ships entering the fleet but rather of fewer being retired. The force growth that is occurring, therefore, is taking place without any net improvement in fleet age.

CURRENT SHIP PROCUREMENT ISSUES--DECISIONS THAT WILL SHAPE THE FUTURE NAVY

This section presents more detail on Navy ship plans, organized by type of ship. Readers not interested in this detail can skip to the discussion of aircraft issues on page 27.

TABLE 4. PROJECTED FLEET MODERNIZATION STATUS FOR OTHER SHIP TYPES IN FISCAL YEAR 1989
(In number of ships)

Ship Type	Modern Ships	Earlier Classes	Percent Modern
Amphibious Ships	14	52	21
Underway Replenishment Ships	15	41	27
Support Ships	33	20	62
Mine Warfare Ships	14	--	100

SOURCE: Congressional Budget Office.

Aircraft Carriers

The current Navy force structure and force goals are premised on the factors discussed in Chapter II. Central to this concept are the aircraft carriers and their associated escorts that form the Navy's chief strike capability. The Administration's force expansion program would increase the number of carrier battle groups from the 12 available in 1980 to 15 by the early 1990s. Of the current force of 14 aircraft carriers, two were built during World War II and eight were commissioned from 1955 through 1965. The World War II carriers, Midway and Coral Sea, are now about 40 years old. Because they have undergone a series of major overhaul and modernization projects in their lifetimes, they are currently programmed to continue in active service into the 1990s. The group of eight carriers commissioned in the 1955 through 1965 period will complete 30 years of very active service beginning in 1985. Rather than retire these costly ships at 30 years, the Navy elected to extend their service life by about 15 years through a program of extensive shipyard overhauls. These overhauls, called the Carrier Service Life Extension program (CV-SLEP), take two years and cost about $800 million each. This is about one-fourth the time and cost required for a new carrier and results in an extension equal to half of a nominal 30-year service life of a new ship. The expedient of CV-SLEP has delayed from 1985 to 2000 the time when replacements would start to be needed for post-World War II carriers. In the meantime, carriers currently under construc-

TABLE 5. NAVY SHIP ACCESSIONS AND RETIREMENTS OVER FOUR SUCCESSIVE SIX-YEAR PERIODS (By fiscal year, in number of ships)

	1966-1971	1972-1977	1978-1983	1984-1989 a/
New Ships Commissioned	147	90	110	113
Number of Ships Retired	374	295	74	26
Average Age of Ships Retired (In years)	24.6	25.6	29.3	--

SOURCE: Congressional Budget Office, based on Department of the Navy data.

a. Projected.

tion will be used to increase the force level to the 15-carrier goal, a project that will be complete with the commissioning of the USS George Washington (CVN-73) in 1992. 4/

In the early 1990s, having just achieved the goal of 15 carriers, the Navy will be faced with a fundamental decision. The additional 15 years of service life provided by CV-SLEP will expire beginning in the year 2000. Eight carriers will reach the post-SLEP retirement age from 2000 through 2010. Replacements for these ships, if they are to be built and delivered in a timely manner, should be authorized beginning no later than 1993. The Navy and the Congress, therefore, will have to decide whether the prospect for the continued military effectiveness of carriers well into the twenty-first century is sufficiently convincing to merit the large and continued investment needed to maintain the 15-carrier force. If it is determined that the large carriers will be less effective than other kinds of naval forces in the future, then the first quarter of the twenty-first century might be an appropriate time to phase out these largest and most complex of fighting ships. The large investment that would be required to replace the carrier force could then be applied to other kinds of naval forces. If, on the other hand, carriers, with their capacity to be updated continuously with new generations of tactical aircraft, are seen to have a continuing role in naval forces, then a new generation of carriers should be authorized starting about 1993 so that they can begin to enter the fleet in the opening years of the twenty-first century. 5/

Surface Combatants

Surface combatants play an important role in present-day naval forces, not only as escorts for aircraft carriers, amphibious groups, replenishment ships, and convoys, but also as the strike element of battle groups not containing carriers. The strike role has been recently reassumed by surface combatants as a result of the development of long-range cruise missiles coupled with other developments, most notably an independent aviation capability

4. According to the current Navy plan for the World War II era Midway-class carriers, the Midway will continue as an active force carrier to the end of the century and the Coral Sea will replace the still older carrier Lexington as the training ship for naval aviators at Pensacola, Florida, when the George Washington is commissioned.

5. This assumes that current carrier force plans are maintained and that carriers are retired at 45 years of service. A decision to reduce the number of carriers in the fleet or to extend their operating life still further would permit a delay in starting new carrier construction.

using helicopters, such as LAMPS I or LAMPS III. After a long period during which surface combatants seemed destined to be increasingly outclassed by high-performance aircraft and nuclear submarines, their future now appears brighter as a result of a substantial increase in the radius of their tactical capabilities brought about by a confluence of new developments in weapons, sensors, vertical/short take-off and landing (V/STOL) aircraft, and, perhaps most important, the prospect of advanced information systems for tying them together. Incorporating these new technologies, future surface combatants might provide a more distributed tactical naval force to supplement or, perhaps eventually replace, the large-deck aircraft carrier. Surface combatants, therefore, remain an important component of today's Navy and could evolve as a still more important part of future naval forces.

According to current force goals, the Navy sees a need for at least 137 battle group surface combatants (CGNs, CGs, DDGs, and DDs) and 101 frigates (FFGs and FFs). It now appears that the Navy will fall short of this goal in 1989 in terms of the number of ships available, and, as discussed above, many of the ships that will be available in 1989 will be old and technologically obsolescent. To replace those ships retired in the 1990s and beyond, the Navy is building the CG-47 Ticonderoga class cruisers and the DDG-51 Arleigh Burke class destroyers. These ships currently cost about $1 billion each, however, and even if the Navy's procurement plans for these classes are fully funded in the future, cruiser/destroyer force levels will lag considerably behind the Navy's stated objectives through the year 2000. As was the case when CBO reported on this subject in 1981 and again in 1982, an affordable surface combatant with adequate combat capabilities remains an important need for the U.S. Navy. 6/

Submarines

When the Reagan Administration took office, the attack submarine force numbered 81, and the Navy's stated force goal was 90. The Administration has increased the force goal to 100 nuclear-powered attack submarines (SSNs) and the force actually at sea, as of the end of fiscal year 1984, has increased to 98 (including four diesel-electric submarines still in service). The submarines added to the force during this period were the result of authorizations made by previous administrations; indeed, all but one enter-

6. See Congressional Budget Office, *Naval Surface Combatants in the 1990s: Prospects and Possibilities* (April 1981); and *Building a 600-Ship Navy. Costs, Timing, and Alternative Approaches* (March 1982).

ing the force between 1981 and 1984 were authorized before the Carter Administration. At the end of fiscal year 1984, there were, in addition, 20 SSNs under construction or authorized (including authorizations through fiscal year 1985) which will be delivered throughout the rest of the 1980s. The Administration requested and obtained authorization for two SSNs in fiscal year 1982, two more in 1983, three in 1984, and four in 1985.

The size of the attack submarine force over the next decade will depend upon the service life extracted from currently operational submarines, as shown in Table 6. If submarines are retained in the force for 30 years, then the goal of 100 SSNs will be achieved and maintained with currently authorized and projected new construction. If, on the other hand, current submarines are retired after 25 years, as has been the case recently, then the force level will return to about 90 SSNs. The above projections assume that the authorization level of four SSNs per year, achieved in fiscal year 1985, is sustained.

The Navy is developing a design for a new class of attack submarines, proposed for initial authorization in fiscal year 1989. This class, designated

TABLE 6. PROJECTED ATTACK SUBMARINE FORCE LEVELS, ASSUMING RETIREMENT AFTER 25 AND 30 YEARS OF SERVICE (By fiscal year, in number of ships)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Assuming 30-Year Service Life										
Added		4	3	4	4	4	5	4	4	3
Retired		2	1	2	2	4	1	4	4	1
At End of Year	98	100	102	104	106	106	110	110	110	112
Assuming 25-Year Service Life										
Added		4	3	4	4	4	5	4	4	3
Retired		12	4	4	1	4	0	3	6	6
At End of Year	98	90	89	89	92	92	97	98	96	93

SOURCE: Congressional Budget Office, based on Department of the Navy data.

as "SSN-21," will be significantly faster, larger, and more expensive than the SSN-688 class submarines currently in production. The lead ship is expected to cost about $2.0 billion. The cost of later ships is not yet known, but, assuming, as a rule of thumb, 75 percent of the lead ship price, it would be about $1.5 billion per ship (in fiscal year 1986 dollars), compared with about $700 million for each SSN-688. Because of the higher cost, sustaining submarine force level goals in the future might be more difficult.

Even the Administration's goal of 100 SSNs is constrained by budgetary considerations with a goal derived from military needs. Recent testimony to the Congress by senior naval officers indicates that the minimum acceptable SSN force level, as derived from an assessment of military requirements, is between 130 and 140 units. Achieving that kind of level with ships as expensive as the the SSN-688 or the proposed SSN-21, however, appears unlikely.

This budgetary problem has stimulated suggestions from several quarters, including the Congress, that the Navy resume construction of diesel-electric submarines. Advocates of diesel-electric submarines argue that, even though they are individually less capable than nuclear-powered submarines, they are so much less expensive (procurement estimates run as high as 6 or 7 diesels to 1 SSN-688 class) that, in many missions, the collective capabilities of several disel-electric submarines would exceed those of the single SSN that could be obtained for the same price. 7/ In this view, a mix of nuclear and diesel-electric submarines would lead to higher force levels and better overall capabilities. This, indeed, is the path apparently taken by the Soviet Union, which from 1976 through 1983 launched 36 nuclear-powered and 30 diesel-electric attack submarines. 8/ During that same eight-year period, the U.S. launched 31 attack submarines, all nuclear-powered.

In the early 1980s, the Senate Armed Services Committee directed the Navy to examine diesel-electric submarine designs and to provide recommendations for a program leading to a design suitable for authorization. 9/

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7. The relative ratio for diesel-electric submarines as compared with nuclear-powered submarines would be less if based on life cycle cost as opposed to procurement cost since operating costs for the several diesel submarines would exceed that of one SSN.

8. Testimony of Vice Admiral Nils R. Thunman, USN, Deputy Chief of Naval Operations (Submarine Warfare) before the Subcommittee on Seapower and Strategic and Critical Materials of the House Armed Services Committee, 98:1 (1984), p. 142.

9. See Senate Armed Services Committee, *Authorizing Appropriations for Fiscal Year 1984 for Military procurement, Research and Development, Active Duty Selected Reserve,*

The House Appropriations Committee, citing Navy testimony as to the need for a force of 130 to 140 attack submarines and the prospect of retiring half the current inventory of about 90 submarines during the 1990s, expressed concern about the long-term prospects for maintaining needed force levels. The Committee directed the Navy to study the concept of diesel-electric submarines as a complement to the nuclear attack submarine force. 10/

The Navy responded to these directives with a study issued in the summer of 1981. 11/ That study recommended against further consideration of diesel-electric submarines of either foreign or domestic design. All foreign designs were dismissed as "not satisfying U.S. requirements without extensive modifications." Making such modifications, it was concluded, would require the "transfer of an extraordinary amount of engineering technology" and foreign designs, therefore, should be eliminated from further consideration. A hypothetical U.S. diesel-electric submarine design, called SS-X, was then described and compared analytically with an SSN-688 class submarine. The study concluded that the diesel-electric SS-X would not be cost effective in comparison with an improved 688 class submarine. The Navy study is unlikely to be convincing to diesel-electric submarine advocates, however, for two reasons. First, it did not compare any of the foreign designs in the operational analysis in the ratios implied by the foreign prices; and, second, the hypothetical SS-X had lesser capability and a substantially higher price than designs proposed by foreign shipbuilders.

More recently, it has been proposed that diesel-electric submarine production be started in one or more U.S. shipyards to produce submarines for sale to foreign governments. Despite the acute need for ship orders in the depressed U.S. shipbuilding industry, the Navy has opposed this suggestion, arguing that it would siphon submarine design and construction resources away from U.S. programs. Navy opposition to any diesel-electric submarine construction in the U.S. remains unyielding, even for foreign designs built for foreign customers in shipyards that are not engaged in U.S. submarine production.

In view of the Navy insistence on nuclear-powered attack submarines, production of SSN-688 class submarines will probably continue through 1989,

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and Civilian Personnel Strengths, Civil Defense, and for Other Purposes, Report No. 96-826, 96:2 (1980); and *Department of Defense Authorization for Appropriations for Fiscal Year 1982*, Report No. 97-58, 97:1 (1981). The second request was made because the Navy had not replied to the first.

10. See House Appropriations Committee, *Department of Defense Appropriation Bill, 1982*, Report 97-333, 97:1 (1981).

11. Department of the Navy, *Diesel-Electric Submarine Force Mix Study (U)* (July 1981).

leading to a force level ranging from 90 to about 110 units, depending on the service life obtained from currently operational submarines. Beyond the mid-1990s, force levels will drop unless the still more expensive SSN-21 class can be produced in sufficient numbers to replace the submarines that will reach retirement age in that period.

Amphibious Forces

Amphibious warfare--that is, an assault from the sea against an enemy-occupied coast--is one of the most difficult of military arts. While moving from the sea to land, the assault force is very vulnerable and can be subjected to heavy losses if the operation is not conducted crisply. 12/ Amphibious warfare, therefore, requires not only a full measure of the elements of surprise, concentration of force, and adequate logistics, but also the equipment--the specially designed ships and landing craft--that make it possible to project force ashore quickly and smoothly.

The art of amphibious warfare underwent a rapid improvement in the crucible of World War II. Among the innovations of that period was the development of a variety of specialized types of ships and craft designed to facilitate the movement ashore of amphibious troops and their equipment. The development of still more capable amphibious ships continues today, but perhaps the most significant innovation since World War II is the development of a capability to launch amphibious assaults from "over the horizon"--that is, out of sight of the enemy coast. This is intended to reduce the vulnerability of amphibious ships and to increase the uncertainty on the part of the enemy about the location and timing of the assault. Key elements of the over-the-horizon assault capability are the high-speed landing craft, air-cushion (LCAC) and aircraft--the CH-53E heavy-lift helicopter and the V-22 Osprey V/STOL aircraft, formerly known as the JVX. The Administration plans ultimately to procure about 90 LCACs, whose cost is now running at about $25.6 million each. Current planning also includes procurement of 67 CH-53E helicopters from 1986 through 1990, and their cost is now about $21 million each. The V-22 is still in development and procurement quantities and unit costs have not been announced.

In fiscal year 1980, the Navy's amphibious lift capability--that is, the capacity to carry Marine Corps troops and equipment in ships designed to support amphibious landings, as distinct from the actual assault forces--was judged sufficient for the assault echelon of one Marine Amphibious Force

12. The British landing at Galipoli in World War I is a classic example of what can happen when an amphibious operation does not go well.

(MAF), which has about 32,500 troops. The Administration proposes to increase amphibious lift to a capacity sufficient to support the assault echelons of one MAF plus a Marine Amphibious Brigade (MAB), or a total of about 48,000 troops and their equipment. Seven amphibious ships were authorized from 1981 through 1985--six landing ships dock (LSDs) and one amphibious assault ship (LHD). The LSDs are intended to replace an earlier class of the same type now being retired, and the LHD is similar to an earlier kind of amphibious ship, designated LHA, and built in the 1970s. The 1986 through 1990 shipbuilding plan includes eight additional LSDs, four LHDs, and a service life extension program for seven older amphibious transports dock (LPDs) in the 1988 through 1990 period. The proposed program for amphibious ship construction from 1986 through 1990 would cost about $7.5 billion (in fiscal year 1986 dollars), which is about 11 percent of the total shipbuilding program. No amphibious ships at all were authorized in the 1972 through 1980 period. In the years beyond 1990, this study assumes continued replacement of amphibious vessels with the most modern classes of ships in quantities sufficient to maintain a lift capacity for one MAF plus a MAB. If, however, construction of amphibious ships is allowed to lapse again, then lift capacity could rapidly fall below that objective.

Auxiliary Ships

In his 1925 annual report, the Commander-in-Chief, U.S. Fleet, wrote:

> Except for relatively short operations in the nature of raids, sweeps, or patrols, either by the whole combatant body of the Fleet or by detached portions thereof, there will probably never be a Fleet operation in war wherein the United States Fleet will not be accompanied by auxiliary vessels.
>
> The speed of these auxiliary vessels sets the speed of the Fleet.
>
> . . . the Commander-in-Chief is impressed with the complete dependence of the combatant vessels of the United States Fleet upon the service rendered by auxiliaries. . . . for whatever may be the number and characteristics of the combatant vessels, they cannot be used to the fullest extent of their speed, radii of action, and offensive power, unless they can be accompanied by auxiliary vessels.

In the 60 years since these words were written, little has changed. If anything, U.S. naval forces have grown even more dependent on the support

of auxiliary ships. The worldwide operational capability of the U.S. Navy, taken for granted in peacetime and most certainly for any war planning, could not exist without the services of the hard-working auxiliary ships.

The term auxiliary ship encompasses ships that perform a variety of tasks. The Navy groups them into these categories:

- o Mobile Logistics Ships:
  - -- Underway replenishment (UNREP) ships that resupply ships at sea; and
  - -- Material support ships, also called tenders, that serve as floating repair facilities; and
- o Support Ships:
  - -- Fleet support ships, a category that includes such types as fleet tugs (ATF), salvage ships (ARS), and submarine rescue ships (ASR); and
  - -- Other auxiliaries, a category for ships that do not fit in the previous groups.

Of these, the underway replenishment ships are perhaps the most vital to sustained operations at sea.

In underway replenishment, it is important to minimize the time a warship must spend alongside the replenishment ship. In the Navy's underway replenishment concept, warships in the battle group would be resupplied by multiproduct "station ships," which would provide fuel, ammunition, and stores in a one-stop replenishment. 13/ The station ships would be resupplied by "shuttle ships"--oilers (AOs), ammunition ships (AEs), and stores ships (AFSs)---in the underway replenishment group. The shuttle ships, in turn, would be resupplied at advance bases with materials brought in by merchant ships.

Thus, the Navy seeks to establish a logistics chain culminating in a rapid transfer of fuel, stores, and munitions to operating warships at sea.

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13. Station ships are designated as AOEs and AORs. AOEs are larger (53,000 tons vs. 37,000 tons) and faster (29 knots vs. 21 knots) than AORs.

Since replenishment ships are essential for sustained operation at sea, loss of any link in the chain could result in loss of the logistics flow and, therefore, loss of the battle group's ability to sustain operations. Any decision to expand the size of the battle fleet, therefore, requires a commensurate expansion of the mobile logistics support force. Navy planning currently considers a force of about 64 replenishment ships to be the minimum needed to support a 15-carrier Navy. Table 7 shows the types of planned replenishment ships.

Any estimate of the number of the mobile logistics support ships needed to support naval operations depends upon a host of assumptions, one of the most important of which is the distance the combatant fleet operates from its support base. Against this criterion, the current Navy objectives, as shown in Table 7, represent an optimistic, or lower bound, assessment of what would be needed.

During the four-year period of 1982 through 1985, the Congress authorized construction of 18 new auxiliary ships and conversion or acquisition of 15 additional auxiliaries. This total of 33 ships represents 37 percent of all new construction/acquisition/conversion projects undertaken during that period, but only 6.4 percent of total Shipbuilding and Conversion, Navy

TABLE 7. REPLENISHMENT SHIPS: OBJECTIVES AND CURRENT FORCE (In number of ships)

Ship Type	Objective	Current Force
Multiproduct Station Ships (AOE/AOR)	15	11
Oilers (AO/TAO)	23	18
Ammunition Ships (AE/TAE)	16	13
Refrigeration Stores Ships (AFS/TAFS/TAF)	10	11
Total	64	53

(SCN) appropriations. This illustrates the fact that auxiliary ships tend to be relatively inexpensive items in the Navy's shipbuilding budget. In the Five-Year Shipbuilding Plan for fiscal years 1986 through 1990, the Administration plans a total of 38 new construction/acquisition/conversion projects for auxiliary ships, which is 29 percent of all projects planned. The projected cost of about $6.6 billion (in fiscal year 1986 dollars) is about 10 percent of total SCN appropriations projected for the five-year period. Thus auxiliary ships are estimated to be a smaller fraction of total SCN projects but a larger fraction of SCN expenditures than has been the case in the recent past.

Mine Warfare Forces

Although mine warfare is among the least glamorous of naval activities, it is also one of the most potent threats in the entire arsenal of naval weapons. Not only can mines destroy enemy merchant and naval ships at low cost to the nation deploying them, but the very threat of mines can paralyze large numbers of enemy ships. Mines used by an inferior naval power can greatly inhibit the use of the seas by a dominant power, and the dominant power can use mines efficiently to solidify its control over ocean areas against potential challengers. Mine warfare, therefore, deserves careful consideration in developing naval plans and programs.

The Soviet Union is not unaware of the effectiveness of mines and is known to have the world's largest stockpile of mine warfare weapons. The U.S. mine warfare fleet has dwindled from about 100 ships in the mid-1960s to the present level of 21 ships, almost all of which are over 25 years old and all but three of which are assigned to the Naval Reserve. The Navy plans to improve capabilities in this long-neglected area by building at least 31 new mine warfare ships, designated MCM and MSH. The lead MCM was authorized in fiscal year 1982, and the lead MSH in 1984. The total cost for the new mine warfare ships is expected to be about $2.2 billion in fiscal year 1986 dollars.

NAVAL AIRCRAFT PROGRAMS

At the end of fiscal year 1980, the total active aircraft inventory for the Department of the Navy (including aircraft operated by the Navy, Naval Reserve, Marine Corps, and Marine Corps Reserve) was 5,360. Five years later, at the end of 1985, the total active inventory was 5,627. In the meantime, the Congress authorized procurement of 1,029 new aircraft and appropriated a total of $43 billion (in fiscal year 1986 dollars) for the air-

craft procurement account (APN). 14/ Most of these aircraft will have been delivered by the end of 1986, at which time the active inventory will have grown to about 5,720.

Although it may seem discouraging that the expenditure of $43 billion for airplanes could have so little effect on the total force level, there have been some concrete results. A thirteenth carrier air wing was added in 1984 and a fourteenth is planned for 1987. (Each carrier air wing consists of the 80 to 90 airplanes deployed at sea, plus associated support aircraft.) The Navy is attempting to modernize its air fleet, but, as is the case with ships, the new units now being procured carry high price tags. The unit prices for some higher-cost Navy/Marine Corps aircraft, as reflected in the fiscal year 1986 budget request, are:

Aircraft	Unit Cost (In millions of dollars)
F-14A (Fighter)	$46.6
F/A-18 (Fighter/Attack)	32.2
A-6E (Attack)	35.7
E-2C (Early Warning)	59.7
P-3C (Patrol)	46.5
EA-6B (Electronic Warfare)	39.0

With prices such as these for replacement aircraft, the Navy has found it difficult to procure enough aircraft to maintain, let alone expand, its air fleet. One result has been a tendency to extend the operating life of existing aircraft to more venerable ages than had been the practice in the past. While there is no "correct" age for retiring aircraft, the Navy's judgment is that 20 years is an appropriate time. Actual retirement ages for various types of Navy aircraft currently range from 14 to 30 years, with an average of 24 years. If aircraft were retired at 20 years, the average age of the fleet should be about 10 years. Today, two-thirds of all the Navy's aircraft are 10 years of age or older, and almost half have been in service 15 years or more, with an average age of just below 13 years (see Figure 2). Under current Navy plans for procurement and retirement, the average age will increase to above 13 years and stay there through 1989. A continuing problem for the Navy, with aircraft as well as with ships, therefore, is procuring enough units to maintain force size and age goals, given the high price of most current types.

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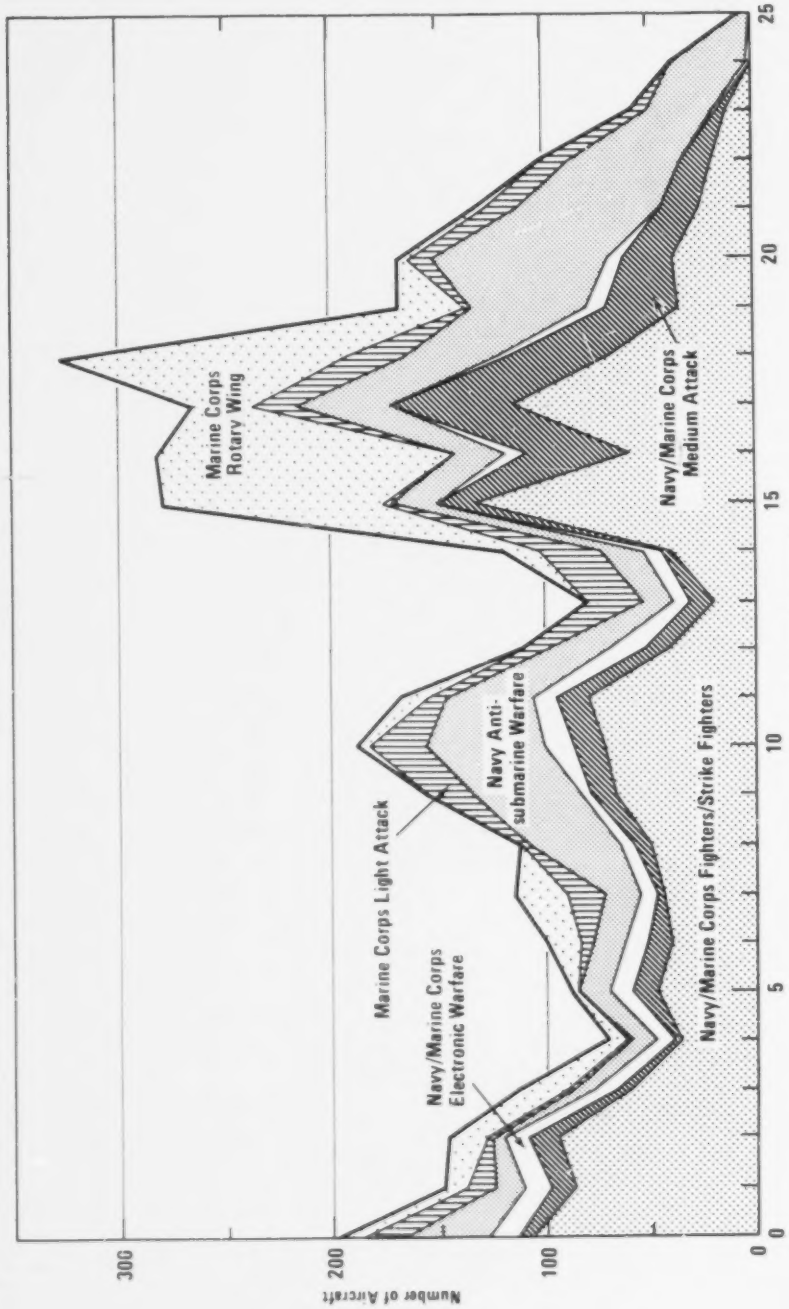
14. The aircraft procurement, Navy, account includes funds to modify existing aircraft and to procure spares and support equipment as well as to procure new aircraft. About 60 percent of APN funds are spent on new aircraft.

Figure 2.

Age Distribution of Navy/Marine Corps Combat Aircraft, Fiscal Year 1985



SOURCE: Congressional Budget Office, "Combat Aircraft Plans in the Department of the Navy: Key Issues," Staff Working Paper (March 1985).

As of the budget submitted in February 1985, the Navy's five-year plan for aircraft procurement for 1986 through 1990 contains new procurement of 1,655 aircraft, modification of existing aircraft, and spare parts procurement at an anticipated total cost of about $71.0 billion in fiscal year 1986 dollars. Table 8 presents details of this program. If this five-year procure-

TABLE 8. NAVY FIVE-YEAR AIRCRAFT PROCUREMENT PLAN AND BUDGET (By fiscal year, in number of aircraft)

Aircraft Type	1986	1987	1988	1989	1990
A-6E/F	6	6	12	12	12
EA-6B	12	12	9	9	9
AV-8B	46	47	48	60	35
F-14A/D	18	18	12	24	24
F/A-18	84	102	120	122	146
CH-53E	14	14	14	14	11
AH-1T	22	--	--	--	--
SH-60B	18	18	18	18	18
CV IZ Helo	--	7	24	30	30
P-3C	9	9	8	8	8
RP-3D	--	--	1	1	1
JVX	--	--	--	18	42
E-2C	6	6	6	6	6
SH-2F	6	--	--	--	--
C-9	--	--	--	--	--
UC-12B	12	12	--	--	--
C-2	8	9	--	--	--
T-34C	38	50	--	--	--
T-44	--	15	--	--	--
Adversary	12	--	--	--	--
T-45A	--	--	12	24	24
TH-57	--	--	--	--	--
E-6A	2	4	6	2	--
KC-130T	--	--	--	--	--
VH-60	9	--	--	--	--
UH-60	--	--	--	--	--
Total Numbers	322	329	290	348	366
Budget (In billions of 1986 dollars)	12.1	12.8	14.3	16.2	15.6

SOURCE: Department of the Navy Fiscal Year 1986 Budget Submission.

ment program were implemented as planned, it would be significantly larger than those of the most recent five years. From 1981 through 1985, the Navy (including Marine Corps) procured a total of 1,328 aircraft for about $54.5 billion in fiscal year 1986 dollars. (Total also includes funding for modification and spares.) The proposed 1986-1990 program would purchase 25 percent more aircraft with a 30 percent higher budget.

Projected totals for combat aircraft are shown in Table 9. Despite the substantial growth in aircraft purchases and budgets, CBO's analysis

TABLE 9. PROJECTED SHORTFALLS/OVERAGES IN COMBAT AIRCRAFT IN 1992 (By fiscal year, in number of aircraft)

Aircraft	1985 Inventory	1986-1992 Projected Losses a/	1986-1992 Projected Gains b/	1992 Inventory	1992 Requirements	Surplus (+) Deficit (-)
Short of Requirements						
A-6/KA-6	413	51	58	420	544	-124
AH-1	94	27	44	111	135	-24
CH-46/V-22 c/	281	17	60	324	336	-12
E-2	90	19	37	108	124	-16
P-3	89	35	62	116	143	-27
SH-3/SH-60F d/	137	104	91	124	188	-64
SH-2	92	68	27	51	108	-57
S-3	165	14	0	151	192	-41
Total						-366
In Excess of Requirements						
F/A-18	249	125	742	866	727	+139
F-14	426	83	126	469	443	+26
AV-8B	35	52	295	278	236	+42
SH-60B	37	17	135	155	145	+10
CH-53	220	31	77	266	244	+22
Total						+239

SOURCE: Congressional Budget Office, "Combat Aircraft Plans in the Department of the Navy: Key Issues," Staff Working Paper (March 1985).

a. Losses include retirement based on the Navy's planned service lives and attrition based on the Navy's attrition factors.

b. Gains are deliveries which may lag procurement by as much as two years--hence gains during this time period include earlier years procurement.

c. The V-22, the Marine Corps' medium assault helicopter, was previously called the JVX.

d. The SH-60F, which will form part of the Navy carrier wing, was previously called the CV Helicopter.

suggests that the Navy will still be short of the requirements associated with Navy and Marine Corps plans for combat forces by 1992, when all the aircraft in the 1986-1990 procurement plan should have been delivered. 15/ CBO's assessment indicates that there will be shortfalls in nine types of aircraft totaling 366 units. On the other hand, the Navy will buy 239 more units of five types than current requirements demand. This mismatch between Navy procurement plans and requirements stems in part from a recent shift in the Navy's planned composition for most of its air wings. Such mismatches will probably be reduced or eliminated through future program changes, but the net deficiency of 127 aircraft indicates that, even if current budget plans are fully funded, there will still be force level deficiencies into the early 1990s.

15. For a more complete discussion, see Congressional Budget Office, "Combat Aircraft Plans in the Department of the Navy: Key Issues," Staff Working Paper (March 1985).

CHAPTER IV

CBO METHODOLOGY FOR ESTIMATING FUTURE NAVY BUDGET REQUIREMENTS

Concerns have been raised about the future budget costs of the Administration's naval plans discussed in Chapter III. Because the Administration usually does not publish its long-term cost estimates in unclassified form, this chapter describes the methodology used by CBO to develop estimates of future budget requirements for the Department of the Navy (including the Marine Corps). This includes estimates of investment necessary to achieve the Administration's force levels and modernization goals and estimates of support budgets to maintain a larger and more modern fleet.

INVESTMENT COSTS

The two most significant Navy investment accounts are Aircraft Procurement (APN) and Shipbuilding and Conversion (SCN). The CBO assessed these accounts directly, year by year, by estimating the numbers and types of ships and aircraft that should be procured each year to reach and sustain the Navy's force objectives.

The shipbuilding plan displayed in Table 10 shows the numbers of ships of various types that should be authorized each year through fiscal year 2000 and the estimated costs expressed in fiscal year 1986 authorization dollars. The estimates for fiscal years 1986 through 1990 are taken from the Navy's Five-Year Shipbuilding Plan. This plan accompanied the Five-Year Defense Plan (FYDP), submitted with the fiscal year 1986 budget in February 1985. The subsequent years are based on CBO's assessment of shipbuilding needs to maintain current force level goals, given ship retirements that should occur in the mid-1990s and beyond. The ships procured beyond 1990 are assumed to be those of current or currently planned programs whenever possible. Other ship designs undoubtedly will be developed by the later years of the projection, but current designs should serve as reasonable proxies for such future ships.

The assumed aircraft procurement plan is shown in Table 11. As was the case with the shipbuilding plan, the procurement from 1986 through 1990 is based on the Administration's plans contained in the FYDP presented with the 1986 budget. For the years beyond 1990, CBO developed aircraft procurement plans that would achieve current force objectives by 1995 and sustain them through fiscal year 2000. As in the shipbuilding projections,

TABLE 10. ASSUMED SHIPBUILDING PLAN FOR FUTURE SHIP REQUIREMENTS, FISCAL YEARS 1986-2000 (In units and billions of 1986 dollars)

Ship Type	1986		1987		1988		1989		1990		1991		1992		1993	
	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
Aircraft Carrier-CVN	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	3.5
Strategic Submarine-SSBN	1	1.6	1	1.6	1	1.6	1	1.6	1	1.6	1	1.6	1	1.6	1	1.6
Attack Submarine-SSN	4	2.7	4	2.9	4	2.7	3	3.1	4	2.8	3	4.5	4	6.0	3	4.5
Cruiser-CG	3	2.8	3	2.8	3	2.9	2	2.0	--	--	--	--	--	--	--	--
Destroyer-DDG	--	--	2	2.1	5	4.1	5	4.0	5	4.0	5	4.0	5	4.0	5	4.0
Destroyer-DD	--	--	--	--	--	--	--	--	--	--	1	0.6	2	1.2	2	1.2
Frigate-FFG	--	--	--	--	--	--	--	--	--	--	1	0.7	--	--	3	1.5
Assault Ship-LHD	1	1.5	--	--	1	0.9	1	0.6	1	1.3	1	1.4	1	1.4	1	1.4
Landing Ship-LSD/LPD	2	0.4	--	--	2	0.5	2	0.5	2	0.5	2	0.5	2	0.5	2	0.5
Mine Warfare Ship-MCM	4	0.3	1	0.1	--	--	--	--	--	--	--	--	--	--	--	--
Mine Warfare Ship-MSH	4	0.2	4	0.2	4	0.2	4	0.2	--	--	--	--	--	--	--	--
Ammunition Ship-AE	--	--	--	--	1	0.4	1	0.3	1	0.3	--	--	--	--	--	--
Stores Ship-AFS	--	--	--	--	--	--	--	--	--	--	1	0.3	1	0.3	1	0.3
Fast Support Ship-AOE	--	--	1	0.7	1	0.5	1	0.5	1	0.5	1	0.5	1	0.5	--	--
Fleet Oiler-AO	2	0.3	2	0.3	2	0.3	2	0.3	2	0.3	--	--	--	--	--	--
Tender-AR/AD/AS	--	--	--	--	--	--	--	--	1	0.5	1	0.5	1	0.5	1	0.5
Miscellaneous Ships	2	0.1	2	0.1	1	0.1	--	--	1	0.1	2	0.2	2	0.2	2	0.2
Total, New Construction	23	9.9	20	10.8	25	14.2	22	13.1	19	11.9	19	14.8	20	16.2	22	19.2
Conversions & Other Costs		1.9		2.3		1.4		1.4		1.8		2.6		2.9		3.4
Total, Shipbuilding and Conversion		11.4		13.1		15.6		14.5		13.7		17.4		19.1		22.6

(Continued)

TABLE 10. (Continued)

Ship Type	1994		1995		1996		1997		1998		1999		2000	
	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
Aircraft Carrier-CVN	1	3.5	1	3.5	--	--	--	--	1	3.5	1	3.5	1	3.5
Strategic Submarine-SSBN	1	1.6	1	1.6	1	1.6	1	1.6	1	1.6	1	1.6	1	1.6
Attack Submarine-SSN	3	4.5	3	4.5	4	6.0	4	6.0	3	4.5	3	4.5	4	6.0
Cruiser-CG	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Destroyer-DDG	5	4.0	5	4.0	5	4.0	5	4.0	5	4.0	5	4.0	--	--
Destroyer-DD	2	1.2	--	--	--	--	--	--	--	--	--	--	--	--
Frigate-FFG	5	2.5	5	2.5	5	2.5	5	2.5	5	2.5	5	2.5	5	2.5
Assault Ship-LHD	1	1.4	--	--	1	1.4	1	1.4	--	--	--	--	--	--
Landing Ship-LSD/LPD	2	0.5	2	0.5	2	0.5	2	0.5	2	0.5	2	0.5	2	0.5
Mine Warfare Ship-MCM	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mine Warfare Ship-MSH	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ammunition Ship-AE	--	--	1	0.4	1	0.4	--	--	--	--	--	--	--	--
Stores Ship-AFS	--	--	--	--	--	--	1	0.3	--	--	--	--	--	--
Fast Support Ship-AOE	--	--	--	--	1	0.5	--	--	--	--	--	--	--	--
Fleet Oiler-AO	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2
Tender-AR/AD/AS	1	0.5	1	0.5	--	--	--	--	1	0.5	1	0.5	1	0.5
Miscellaneous Ships	2	0.2	2	0.2	2	0.2	2	0.2	2	0.2	2	0.2	2	0.2
Total New Construction	24	20.1	22	17.9	23	17.3	22	16.7	21	17.5	21	17.5	17	15.0
Conversions & Other Costs		3.5		3.2		3.1		2.9		3.1		3.1		2.6
Total, Shipbuilding and Conversion		23.6		21.1		20.4		19.6		20.6		20.6		17.6

SOURCE: Congressional Budget Office.

TABLE 11. ASSUMED AIRCRAFT PROCUREMENT, NAVY (APN) PLAN FOR FISCAL YEARS 1986-2009 (In units and billions of 1986 dollars)

Aircraft	1986		1987		1988		1989		1990		1991		1992		1993	
	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
F-14	18	0.80	18	0.80	12	0.96	24	1.36	24	1.20	37	1.65	37	1.65	37	1.65
F/A-18	84	2.76	102	3.01	120	3.15	122	3.07	146	3.33	24	0.79	24	0.79	24	0.79
AV-8	46	0.98	47	0.99	48	1.05	60	1.14	35	0.59	8	0.17	8	0.17	8	0.17
A-6	6	0.21	6	0.33	12	0.77	12	0.62	12	0.60	42	1.50	42	1.50	42	1.50
EA-6	12	0.48	12	0.47	9	0.53	9	0.56	9	0.48	12	0.48	12	0.48	12	0.48
P-3	9	0.49	9	0.45	8	0.41	8	0.37	8	0.41	26	1.40	26	1.40	26	1.40
E-2	6	0.36	6	0.35	6	0.36	6	0.33	6	0.30	8	0.48	7	0.42	7	0.42
S-3	--	--	--	--	--	--	--	--	--	--	17	0.61	17	0.61	17	0.61
V-22	--	--	--	--	--	0.10	18	1.05	42	1.16	30	0.83	30	0.83	30	0.83
SH-60B	18	0.37	18	0.33	18	0.32	18	0.32	18	0.29	3	0.06	3	0.06	3	0.06
SH-60F	--	0.03	7	0.26	24	0.39	30	0.46	30	0.38	16	0.20	16	0.20	16	0.20
M/CH-53	14	0.29	14	0.22	14	0.21	14	0.20	11	0.20	8	0.17	8	0.17	8	0.17
AH-1	22	0.20	--	0.04	--	--	--	--	--	--	15	0.14	15	0.14	15	0.14
Other APN	87	5.09	90	5.57	19	6.05	27	6.69	25	6.76	25	5.32	25	5.28	25	5.28
Total APN	322	12.06	329	12.84	290	14.30	348	16.18	366	15.71	269	13.80	270	13.70	270	13.70

(Continued)

TABLE 11. (Continued)

Aircraft	1994 Quantity	1994 Cost	1995 Quantity	1995 Cost	1996 Quantity	1996 Cost	1997 Quantity	1997 Cost	1998 Quantity	1998 Cost	1999 Quantity	1999 Cost	2000 Quantity	2000 Cost
F-14	37	1.65	37	1.65	36	1.60	36	1.60	36	1.60	36	1.60	36	1.60
F/A-18	23	0.76	23	0.76	23	0.76	23	0.76	23	0.76	23	0.76	23	0.76
AV-8	8	0.17	8	0.17	8	0.17	7	0.15	7	0.15	7	0.15	7	0.15
A-6	42	1.50	42	1.50	42	1.50	42	1.50	42	1.50	41	1.46	41	1.46
EA-6	12	0.48	12	0.48	11	0.44	11	0.44	11	0.44	11	0.44	11	0.44
P-3	26	1.40	26	1.40	26	1.40	25	1.35	25	1.35	25	1.35	25	1.35
E-2	7	0.42	7	0.42	7	0.42	7	0.42	7	0.42	7	0.42	7	0.42
S-3	17	0.61	17	0.61	17	0.61	17	0.61	17	0.61	17	0.61	17	0.61
V-22	30	0.83	30	0.83	30	0.83	30	0.83	30	0.83	29	0.80	29	0.80
SH-60B	3	0.06	2	0.04	2	0.04	2	0.04	2	0.04	2	0.04	2	0.04
SH-60F	16	0.20	16	0.20	16	0.20	16	0.20	16	0.20	16	0.20	16	0.20
M/CH-53	8	0.17	8	0.17	8	0.17	8	0.17	8	0.17	7	0.15	7	0.15
AH-1	15	0.14	15	0.14	15	0.14	15	0.14	15	0.14	15	0.14	14	0.13
Other APN	25	5.30	25	5.23	25	5.23	25	5.18	25	5.18	25	5.12	25	5.11
Total APN	269	13.69	268	13.60	266	13.51	264	13.39	264	13.39	261	13.24	260	13.22

SOURCE: Congressional Budget Office.

CBO assumed that the aircraft would mirror the types now being procured or planned and would reflect currently estimated prices. Although it is highly probable that different types of aircraft will be developed by the later years of the projection (such as the Advanced Tactical Aircraft, or ATA, now under development), current aircraft are used as proxies for the undefined future types.

In estimating the costs of ships and aircraft, CBO assumed in its basic calculations that future procurement costs for each item would remain at the same real level as in the 1986 budget or, when planned procurement begins after 1986, at the inflation-adjusted 1986 level. Experience suggests, however, that unit prices could increase at rates faster than the rate of inflation. Real increases in unit procurement costs stem from improvements to weapons systems and other factors. As a rough guide to possible price growth in the future, CBO reviewed the procurement prices of a representative group of ships procured in the early 1960s and compared them with the prices of similar ships procured in the 1980s, making suitable adjustments to account for the effects of inflation. This comparison indicated an average real growth rate of about 3 percent per year in the price of Navy ships over the past two decades. A similar comparison was made for aircraft in the period between 1980 and 1986, which indicated an annual real growth rate of 3.8 percent. In view of this evidence of previous real growth in procurement prices, CBO superimposed an annual real growth rate of 3 percent per year on the procurement accounts in two of the three budget projection cases described below.

In addition to ships and aircraft, the Navy and Marine Corps make investment expenditures each year in other accounts: Navy weapons procurement (WPN); other procurement (OPN); Marine Corps procurement (PMC); research, development, test, and evaluation (RDT&E); and military construction (MCON). This study assumes that these categories of spending will retain about the same shares of the total Navy budget that they had, on average, in the fiscal years 1975 through 1984 period. This is a reasonable assumption based on the historical data presented in Table 12. While the budget shares for expenditures in these other accounts are up somewhat in fiscal year 1985 because of the recent emphasis on investment, they have been relatively stable over the long term.

SUPPORT COSTS

Naval support costs are dominated by the military personnel (MILPERS) and operation and maintenance (O&M) accounts. 1/ Navy estimates of

1. Other minor accounts are also counted as support costs in this study, namely, the Navy and Marine Corps Stock Funds and Navy and Marine Corps Family Housing, which together account for about 1.5 percent of the total Navy budget.

MILPERS and O&M, which together account for about half of the fiscal year 1986 Navy budget request, are not normally published beyond the current budget year. Estimating funding requirements for these accounts, therefore, is a key task for projecting future budget levels.

To estimate future O&M and MILPERS budget requirements, CBO used three different methods--two alternative computer models and a ratio-to-force-value approach. The computer models were CBO's Defense Resources Model (DRM) and the Resource Dynamics Model, developed at George Washington University. Both models incorporate the ship and aircraft force levels and procurement assumptions described in this report.

TABLE 12. DEPARTMENT OF THE NAVY BUDGET SHARES
(As a percent of total Navy budget) a/

	Average Share Fiscal Years 1975-1984	Approved Budget Fiscal Year 1985 b/
Investment		
Aircraft procurement	10.4	12.1
Weapons procurement	4.5	4.8
Shipbuilding & conversion	13.8	13.0
Other procurement	5.5	5.9
Marine Corps procurement	1.3	2.0
Subtotal, Procurement	35.5	37.8
Military construction	1.7	1.8
Research & development	9.7	10.2
Total Investment	46.9	49.8
Support		
Operation & maintenance	30.6	30.6
Military personnel	22.1	18.3
Other	0.4	1.3
Total Support	53.1	50.2

SOURCE: Congressional Budget Office, based on Department of Defense data.

a. Numbers may not add to totals because of rounding.

b. Adjusted to remove retirement accrual.

The Defense Resources Model

The DRM uses a "program factor" approach to budget estimating--that is, it relates support costs to forces by assigning an annual support cost to each major unit. These support cost factors are derived from a review of recent budget data. It is a rather complex model that estimates budget requirements according to the following rules:

- Support funding for each ship, aircraft, other item of major equipment, and facility already in the inventory continues at levels proposed by the Department of Defense for the current budget year, as amended by Congressional action. Future changes in support funds for existing equipment and facilities are assumed to result solely from equipment retirements.

- Support funding for each new ship, aircraft, other item of equipment, or facility that enters the inventory is determined by the best available estimates of costs per unit. These estimates are obtained from the Armed Services or, if unavailable, are developed by CBO.

- Funding for support accounts such as training and supply are related, when possible, to numbers of items of equipment and facilities.

The CBO model thus estimates support requirements by assuming that funding per unit remains at current levels, adjusted for changes in force composition. The result can best be viewed as a baseline assuming "current-operations spending." This model is not designed to estimate higher spending per ship, aircraft, and so forth, that might be needed if operating tempo or readiness is increased. Neither does the model estimate the cost of achieving an optimal degree of readiness.

The Resource Dynamics Model

The Resource Dynamics Model uses a variety of estimating techniques to develop its projections and includes the following features:

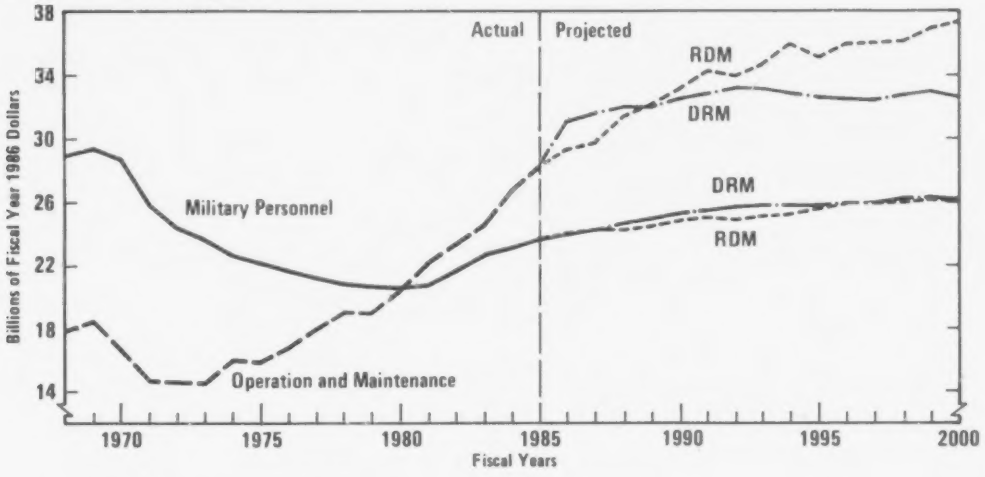
- MILPERS projections are based on estimates of primary and support manpower needs. Primary manpower is a function of the number and types of ships and aircraft in the fleet. Support manpower is, in turn, derived as a function of primary manpower using a series of empirical estimating relationships.

- O&M projections are made by combining separate estimates for ship maintenance, aircraft maintenance, ship operations, and aircraft operations. Maintenance costs are estimated using relationships that include unit value and age as factors. Operating costs are estimated using statistically derived relationships that include ship factors--such as tonnage, generating capacity, steaming hours, and value--and aircraft factors--such as weight, thrust, flying hours, and value. Some miscellaneous items included in O&M are calculated as a function of the total Navy budget.

This model produces somewhat higher estimates for future support costs than does the DRM. This is to be expected since the Resource Dynamics Model is more sensitive to rising fleet value than the DRM. A plot of historical trends in the Navy MILPERS and O&M accounts, together with future projections by the DRM and Resource Dynamics Model, is displayed in Figure 3.

Figure 3.

Department of the Navy Support Costs—Past Trends and Future Projections



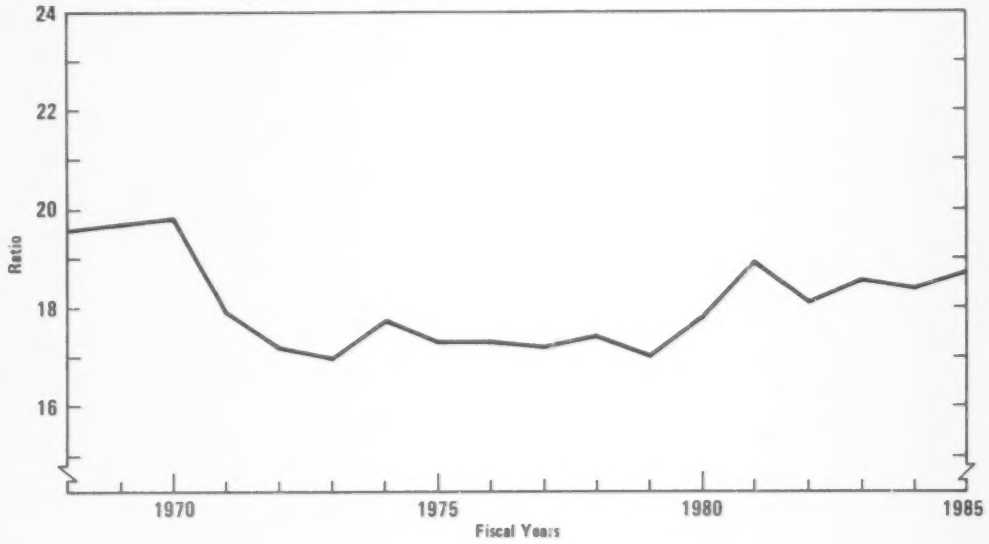
SOURCE: Congressional Budget Office.

NOTE: Projections by Defense Resources Model (DRM) and Resource Dynamics Model (RDM).

Ratio-to-Force-Value Estimation

Finally, a third, and simpler, method assumes that the total cost of military personnel plus operation and maintenance will maintain the same fraction of the total value of the fleet (that is, the total cost of all ships and aircraft, including major modifications) as it did recently. Although there are no persuasive theoretical reasons for believing that this ratio should be constant, the method does have empirical evidence to support it. A constant ratio suggests, for example, that a 10 percent increase in the value of ships would increase all ship support requirements by 10 percent. But some support, such as port facilities, airfields, and administrative facilities, should not have to expand proportionately. On the other hand, the ratio has been roughly steady in recent years. Figure 4 shows the ratio from 1970 through 1984. Although there is some variation, it is not possible to dismiss the contention of a constant ratio from this data. Thus this paper illustrates the effect of this method in some of its estimates. Specifically, Case III, described in Chapter V, assumes that total support budget requirements remain at 18.1 percent of fleet value.

Figure 4.
Ratio of Total Support to Fleet Value



SOURCE: Congressional Budget Office.

Table 13 summarizes these various approaches for estimating future Navy budgets. About 76 percent of the budget is estimated directly or through the models and about 24 percent is estimated through historically derived budget shares.

TABLE 13. CBO METHODOLOGY FOR NAVY BUDGET PROJECTIONS

Navy Account	Estimating Method Used
Aircraft Procurement	Direct Projections
Weapons Procurement	4.6 Percent of Budget
Shipbuilding & Conversion	Direct Projection
Other Procurement	5.6 Percent of Budget
Procurement, Marine Corps	1.3 Percent of Budget
RDT&E	9.6 Percent of Budget
Military Construction	1.5 Percent of Budget
Operation & Maintenance	Defense Resources Model/ Resource Dynamics Model
Military Personnel	Defense Resources Model/ Resource Dynamics Model
Other	1.5 Percent of Budget
Direct Projection/Models	76 Percent of Total
Budget Shares	24 Percent of Total

SOURCE: Congressional Budget Office.

CHAPTER V

PROJECTIONS OF NAVY BUDGET REQUIREMENTS

Future Navy budget requirements will depend upon a host of factors, some governed by future government policy decisions and others influenced by economic and other external conditions. The projections presented here assume policy decisions that CBO believes to be generally consistent with current Navy objectives and practice. All budget figures are stated in terms of fiscal year 1986 dollars.

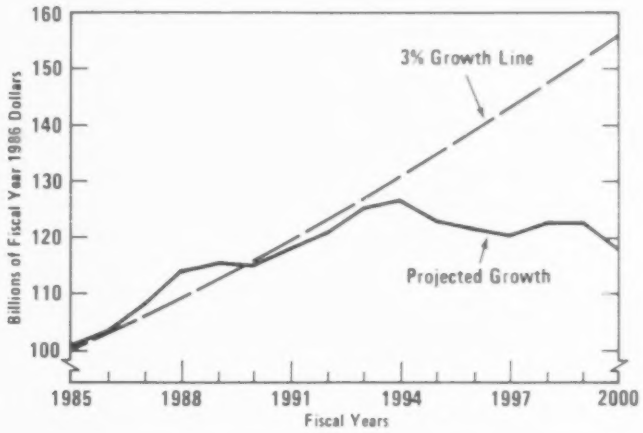
ALTERNATIVE BUDGET ESTIMATES

The CBO has developed three alternatives cases, designated Cases I, II, and III, to project probable future budget requirements for achieving and sustaining the Navy's stated force level and modernization goals. All cases assume actual Administration procurement plans, when known, or procurement consistent with Administration force goals, with fiscal year 1986 cost estimates used as the base. In Case I, it is assumed that no real growth above 1986 levels occurs in procurement prices and that support costs grow relatively slowly, as is predicted by CBO's Defense Resources Model. This results in the lowest budget projection presented here. It is assumed for Case II that ship and aircraft prices experience an average annual real growth of three percent per year and that support costs grow more rapidly, as predicted by the Resource Dynamics Model for the Navy. These assumptions produce a mid-range budget projection. Finally, in Case III, it is assumed that procurement prices are the same as in Case II (average annual 3 percent real growth in prices), but that support costs retain their current level as a fraction of total fleet value. This leads to the highest budget projection.

These three cases are displayed graphically in Figures 5, 6, and 7, and are specified in Appendix Tables A-1, A-2, and A-3. The appendix tables display the detailed results of this study--that is, the appropriation, by account, that would be necessary each year through fiscal year 2000 to accomplish the Navy's objectives, given the assumptions of Cases I, II, and III, respectively. Figures 5, 6, and 7 show the Navy budget projections as contained in the tables. The constant three percent trend line shown in

Figure 5.

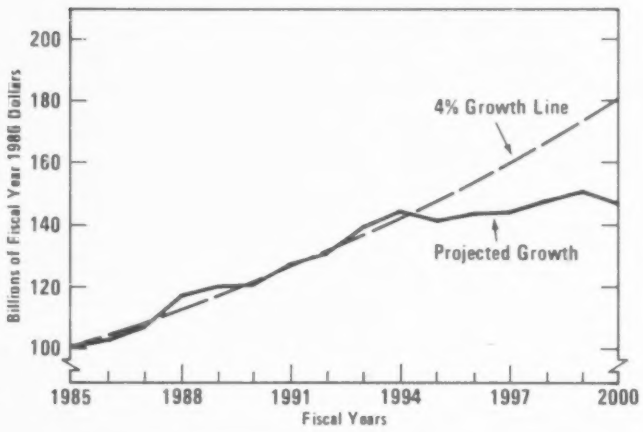
Option I—Navy Budget Projections (Compared with 3 Percent Growth)



SOURCE: Congressional Budget Office.

Figure 6.

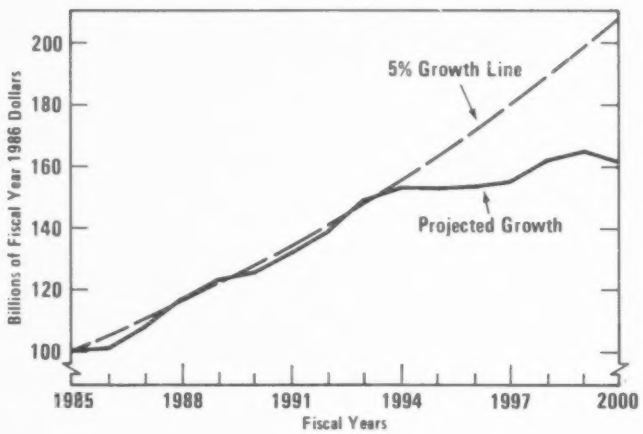
Option II—Navy Budget Projections (Compared with 4 Percent Growth)



SOURCE: Congressional Budget Office.

Figure 7.

Option III—Navy Budget Projections (Compared with 5 Percent Growth)



SOURCE: Congressional Budget Office.

Figure 5 and the constant 4 percent and 5 percent trend lines shown in Figures 6 and 7, respectively, are included simply as indexes for comparison with the indicated budget requirements. Case I results in real growth at a rate of about 3 percent per year through fiscal year 1994, and Cases II and III require a real growth rate of about 4 and 5 percent, respectively, for the same period to achieve the Navy's planned force levels and modernization goals. The statistically averaged growth rates for the three cases are as follows: 1/

Case	Fiscal Years 1985-1994 Annual Real Growth Rate (In percents)	Fiscal Year 1994 Budget Estimate (In billions of fiscal year 1986 dollars)
I	2.5	126.5
II	4.2	144.6
III	5.1	153.1

After 1994, a small decrease or leveling of budgetary expenditures is predicted. Such projections obviously are much more uncertain as they proceed further into the future, but this leveling suggests that the Navy budget for Case II, for example, would reach a new equilibrium at about $145 billion annually after its current expansion program. This amount, however, is about twice the size of the Navy's budget in the 1960s and 1970s.

DISCUSSION OF RESULTS

Much of the growth projected in Cases I, II, and III is fueled by increases in the investment accounts. Under Case I, with no increases in unit procurement costs, annual growth in investment from fiscal years 1985 through 1994 would average 3.8 percent a year. 2/ Under Cases II and III, in which there are assumed increases in unit procurement costs, overall investment growth averages about 6.4 percent a year. This growth reflects the costs of attaining and maintaining a 600-ship Navy, while continuing to modernize

1. By statistical average, CBO means the slope of a least squares regression over all the estimates made for the 1985-1994 period. The average growth considering just the end points, that is 1985 and 1994, is about 2.6 percent for Case I, 4.1 percent for Case II, and to 4.8 percent for Case III.

2. Numbers in this section are based on the ratio of 1994 to 1985 costs and are computed in fiscal year 1986 dollars.

with more expensive vessels. In addition, investment costs are high because of the need to buy more aircraft for the larger fleet. It should be noted that these continuing increases come on top of substantial past growth in investment. From 1980 through 1985, investment grew at an annual average rate of 10.2 percent.

Support costs contribute to growing costs, but by lesser amounts than investment. The computer model estimates indicate that support costs will rise by an average annual rate of about 1.4 percent to 1.9 percent in the 1985-1994 period. The constant ratio-to-fleet-value approach used in Case III predicts a higher growth rate for support of about 3.1 percent annually during that period. All support calculations, therefore, indicate slower growth in support than is projected for investment.

The computer model projections roughly parallel Navy plans for future manpower requirements, one area in which the Department of Defense does publish five-year projections of its support requirements. As of February 1985, the Navy projects a need for a 7.5 percent increase in active-duty military personnel (from 571,000 to 614,000) between the end of fiscal year 1985 and the end of fiscal year 1990. The Resource Dynamics Model projects a 7.2 percent increase in manpower during that period, while the DRM predicts a need for a 9.5 percent increase.

It is possible, however, that all the above estimates of support costs are too low. By fiscal year 1995, the ratio of investment-to-support costs ranges from 1.04 under Case I to 1.25 under Case II. This compares with a ratio of 0.9 today and an average level of 0.73 in the 1970s (see Figure 8). Thus all three cases assume that support costs will continue to decline as a fraction of the total Navy budgets. To the extent that support costs do not decline as projected here, total costs could be even higher than those estimated in this analysis.

The small decrease or leveling of budget requirements projected in the 1995 through 2000 period indicates a settling at a new budget norm after the force expansion that is now in progress. This new norm would be about twice the level, or higher, than that which prevailed for nearly three decades preceding 1980. Such a leveling, however, might not occur because by 1995 the Navy might be procuring entirely new kinds of weapons whose costs are now unknown.

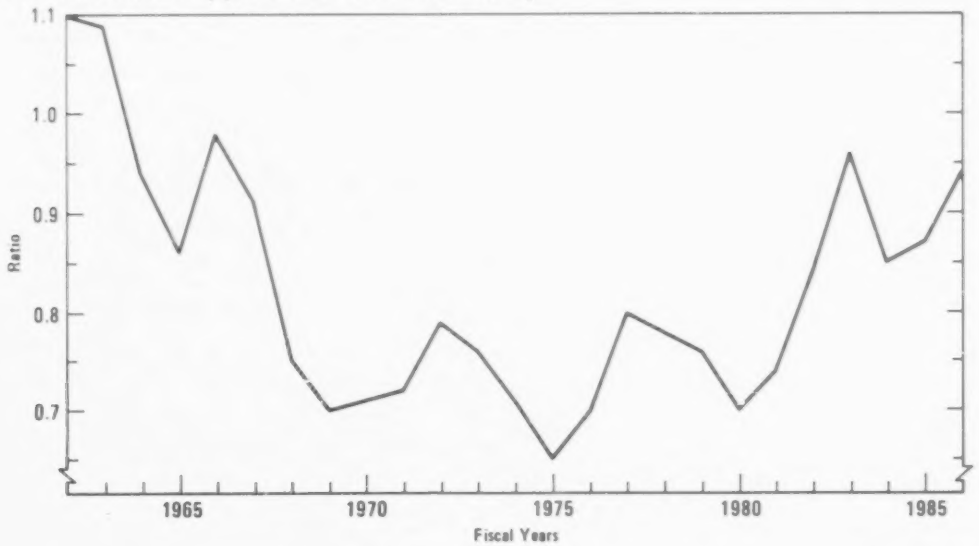
Possible Change in Key Assumptions

The budget projections presented above are based on numerous assumptions that would affect the outcome. The assumptions are not immutable truths,

however, and deliberate policy changes are always possible, including such decisions as:

- Changed force levels;
- Procurement of different kinds of ships and aircraft from those currently planned;
- Changed ship or aircraft service lives;
- Altered support practices;
- Changed readiness goals with respect to training, spare parts, or ammunition stocks;
- Increased use of part-time reserves rather than active-duty personnel; and
- Changed operating tempo.

Figure 8.
Investment/Support Ratio for the Navy



SOURCE: Congressional Budget Office.

Changes might also occur in economic variables, including the following:

- Ship and aircraft prices might change beyond the limits considered in this report.
- Price changes might occur in other items, such as fuel, spare parts, or electronic components.
- Real pay and benefits might change for military or civilian personnel.

These or other factors could affect the projections presented in this study. The most likely changes, and the most significant in terms of budgetary impact, would be those relating to investment, particularly in force levels, prices, and types of ships and aircraft procured. Substantial budget changes, however, also could result from different support practices. The effects such alterations might have are discussed in the next chapter which considers ways to accommodate lower budget levels.

CHAPTER VI

OPTIONS TO ACCOMMODATE LOWER NAVY BUDGETS

The analysis in the preceding chapter suggests that attainment of current Navy force objectives would require continued real budget growth into the mid-1990s, until it is about double the Navy's fiscal year 1980 budget (in fiscal year 1986 dollars)--and, indeed, double the average annual budget levels that prevailed during the 1960s and 1970s. Looked at another way, achieving the Navy's current plans would require a sustained period of real budget growth of 15 years. Yet, since the end of World War II, no period of sustained real growth in the Navy budget has exceeded five years. An important issue, therefore, is what would happen if this kind of continued growth did not occur. This chapter discusses the possible effects of lower budgets on future U.S. naval forces and some alternative strategies to accommodate reduced budgets.

THE EFFECTS OF LOWER BUDGET GROWTH

An illustration of the effects of lower budget growth can be derived by considering the implications of having zero real growth (that is, no growth above that needed to account for inflation) in the Navy budget from fiscal years 1986 through 1995. There is historical precedent for this illustration. During the 1960s and 1970s--apart from a modest increase during the Vietnam War years--zero real growth was the prevailing trend in the Navy budget (see Summary Figure on page xv). 1/ It might now be argued that, with a budget that has grown fully 43 percent in purchasing power above that long-term norm, the Navy should not endure severe privation if further real growth stopped at the current level. A climate of "no real growth" budgets in the future, however, would require drastic adjustments to the Navy's current force plans.

If the Department of the Navy budget were to experience zero real growth over the next 10 years, as opposed to the growth estimated to be

1. The Congressional budget resolution for fiscal year 1986 holds overall defense budget authority to zero real growth in that year, and provides for real increases of about 2 percent annually thereafter under CBO economic assumptions (3 percent per year under the resolution's economic assumptions). See Congressional Budget Office, *The Economic and Budget Outlook: An Update* (August 1985), p. 66.

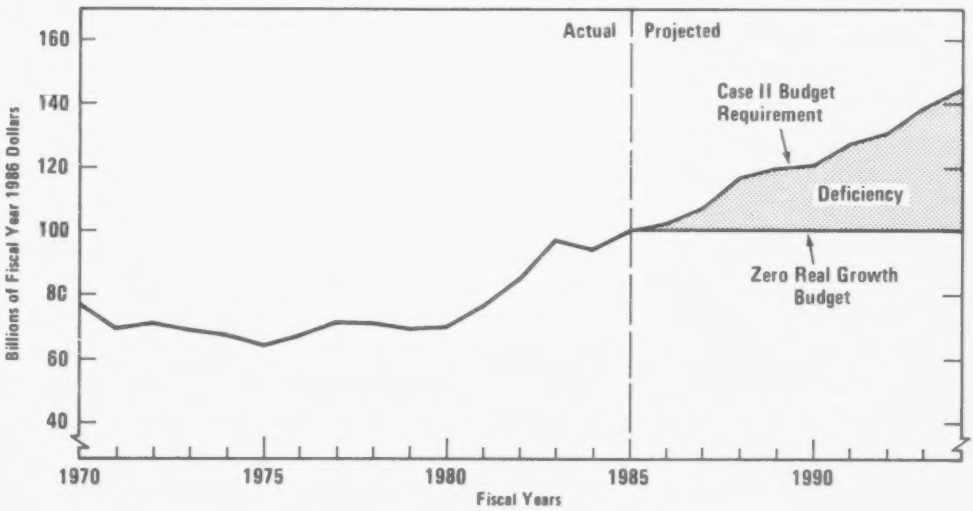
required in Cases I, II, and III discussed in the previous chapter, the cumulative budget deficiencies for the 10-year period would be as follows:

Case	Budget Shortfall (In billions of fiscal year 1986 dollars)
Case I	166
Case II	248
Case III	296

These shortfalls represent about 14 percent, 20 percent, and 23 percent, respectively, of the total budget requirements estimated in Cases I, II, and III as necessary to implement Navy and Marine Corps programs in the 1986-1995 period. The deficiency, using Case II as an example, is shown as the cross hatched area in Figure 9. Obviously, cuts of this magnitude would require such a substantial restructuring of the Navy's plans that careful thought should be given to dealing with this contingency. Some options toward this end are suggested below.

Figure 9.

Navy Budget—Historical Trend and Projected Deficiency for Zero Real Growth Versus Case II Requirement



SOURCE: Congressional Budget Office, based on Department of the Navy data.

OPTIONS TO RECONCILE NAVY PLANS WITH REDUCED BUDGETS

Several basic strategies could be employed to accommodate lower growth in the Navy budget than that required by current objectives. These include:

- Reduce Procurement. Maintain support and absorb budget deficiencies in the investment accounts, principally by procuring fewer ships, aircraft, weapons, and so forth, while continuing the purchase of the types currently favored.

- Reduce Support. Attempt to reduce the impact of budget shortfalls on procurement plans by substantially cutting the support accounts.

- Change Force Mix. Maintain current support and absorb budget shortfalls in the investment accounts, but mitigate the effect on force levels by emphasizing the procurement of less costly ships, aircraft, and weapons.

The three alternatives are not necessarily mutually exclusive or collectively exhaustive, but rather suggest basic modes of emphasis that might emerge from the many difficult decisions the Navy would be forced to make if there were a mismatch between aspirations and available resources. If a significant chance exists that such a mismatch will occur, and most observers would feel there is, then it might be prudent to consider the implications for future naval forces of each alternative strategy, whether explicitly chosen or implicitly evolved.

STRATEGY I -- REDUCE PROCUREMENT

The first strategy for reconciling force plans and lower budgets would make no major changes in support or in the types of ships, aircraft, and weapons procured. Instead, it would absorb budget deficiencies principally through procuring fewer items, but in conformance with the same priorities of current plans. The Navy might be most likely to pursue this approach. In Congressional testimony and public statements, Navy officials have repeatedly emphasized their commitment to maintaining adequate support funding for the operating forces, and have accorded the highest priority to the budgets directly affecting military personnel. These officials have also frequently defended the complex and expensive weapon systems, which have received high priority in recent years, as needed to counter the demanding military threat posed by the Soviet Union. When pressed to express a pre-

ference between quality and quantity, senior naval officials have almost always opted for fewer high-cost systems.

Investment Reduction--Effects on Force Levels

What would happen to the Navy if it had to live with zero real growth in its budget and chose to absorb the impact principally in its investment accounts while continuing to procure the high-cost ships, aircraft, and weapons now planned? To examine the effects more closely, Case II is used as a basis of discussion. The impact would be similar but relatively less severe for Case I and relatively more severe for Case III. More severe still would be a reduction, in real terms, of Navy budgets over time.

Of the roughly $250 billion in total budget reductions from the Case II level that would result from zero real growth during the 1986-1995 period, Strategy I assumes that about 80 percent, or $200 billion, would come from the investment accounts. 2/ Assuming further that the $200 billion reduction in investment would be distributed among the various investment accounts in proportion to their average budget share in the projected budgets for 1986 through 1995, the cumulative 10-year reduction in each investment account would be as follows:

Investment Account	Shortfall (In billions of fiscal year 1986 dollars)
Shipbuilding and Conversion, Navy	61.8
Aircraft Procurement, Navy	51.0
Weapons Procurement, Navy	17.8
Procurement, Marine Corps	5.0
Other Procurement, Navy	21.6
Research & Development	37.1
Military Construction	5.8
Total	200.0

Budget reductions of this degree would substantially affect the Navy's future force structure. In shipbuilding, for example, a reduction of $61.8

2. About 74 percent of the projected real growth in Case II results from increases in the procurement accounts and 26 percent from increases in the support accounts. Since

billion would be about 30 percent of the total 10-year shipbuilding budget required to sustain and modernize a 600-ship Navy, as projected in current Navy plans. Assuming a proportional reduction in the number of ships procured, a total of only 151 ships would be authorized compared with the 216 projected by CBO to achieve current force goals during the 1986-1995 period. Thus a fleet totaling about 600 ships in 1990 would settle back to about 535 ships by the end of the 1990s, as retirements outdistance acquisitions. If, however, the numbers of new auxiliary and support ships were reduced more than proportionately in order to protect the more sophisticated and expensive combatants, then the reduction in numbers of ships would be still higher. Zero real growth for a period of 10 years, therefore, could result in a fleet numbering about 60 to 80 fewer ships than now planned by the end of the century.

Aircraft would be similarly affected. A reduction of $51 billion over the 10-year period would result in the procurement of about 2,000 aircraft (again, assuming a proportionate reduction) as opposed to the 3,000 estimated by CBO to be necessary to realize current force goals. 3/ This reduction of about 1,000 aircraft would clearly have a substantial impact on the structure and capabilities of the Navy and Marine Corps tactical air forces. Moreover, the reduction could be even larger if fewer purchases raised the unit cost of aircraft.

Zero real growth would require similar severe adjustments in other investment areas. Procurement of missiles, torpedoes, and other weapons would be reduced by about a third. This could further curtail the Navy's ability to build up the weapons stocks required to sustain combat in a protracted war, an area of military capability that some feel has been long underfunded. Marine Corps procurement and the miscellaneous equipment and spares bought with other procurement, Navy (OPN) funds would be decreased by about 31 percent, assuming proportional reductions. The $37.1 billion reduction in research and development spending would lower efforts in this area by about a third.

Obviously, policy decisions could be made that would reallocate the effects of budget reductions in other ways than those assumed here. Areas

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at least some real growth in support should be required for the larger number of more complex ships and aircraft presently programmed, CBO assumes, at least for this Strategy I analysis, that the investment accounts would absorb more than a proportionate share of the budget deficiencies.

3. About 40 percent of APN funds are used for aircraft rework and procurement of support equipment and spares. It is assumed that reductions for procurement of new aircraft and for these other functions are made in their current proportions.

in which the impact was reduced, however, would have to be offset by more severe cutbacks in other areas. The allocation assumed above, which reflects recent budget shares, however, should provide a realistic insight into the likely effects of budget shortfalls of this magnitude.

Considering Navy procurement priorities, Strategy I is the policy that probably would emerge, either by design or default, with less than adequate budget growth to achieve the Navy's current goals. Zero real growth would produce about the force levels outlined above. For higher or lower rates of growth, the effects would be similar but less or more severe, depending upon the degree of shortfall in the budgets. Strategy I would produce a fleet similar to the one now planned, with currently programmed types of ships and aircraft, but with the important difference of being significantly smaller. Since one of the key naval weaknesses cited by Administration officials has been an inadequate number of ships and aircraft to deal with U.S. worldwide naval commitments, this could be a serious deficiency. The ships, aircraft, and weapons systems that were available, however, would be largely of the types the Navy deems suited to expected threats.

Investment Reduction--Keeping Ships Longer

To mitigate the force level reductions that would normally result from procuring fewer ships and aircraft, the Navy could keep units in the fleet longer. This expedient could maintain the numerical size of the fleet at higher levels but would not, of course, promote fleet modernization. Modernization is an important aspect of the Navy's planned buildup because of the increasingly sophisticated threat posed by potential enemy forces. Indeed, in arguing for the highly capable ships and aircraft now being procured, the Navy has repeatedly emphasized the severity of this threat and the resulting need for units with the latest technology.

Maintaining force levels with units that are older than the 30- to 45-year service lives assumed in this study would be, at best, only a partial solution and might, in fact, serve to increase operating costs while obscuring real deficiencies in the fleet capabilities. For example, many ships in the current destroyer force will reach 30 years of service in the 1990s, including the 23 DDG-2 class destroyers that were commissioned from 1960 through 1964. These ships are scheduled to be replaced by the DDG-51 class destroyers which, though far more capable, will cost at least $800 million each. If procurement of DDG-51 class ships is slowed by insufficient budgets, then DDG-2 class ships could be retained into their fourth decade of service to offset some of the numerical fleet shrinkage. The DDG-2, however, with its obsolescent weapons systems, would be a questionable per-

former in the current combat environment. The ships of this class were scheduled for modernization (with funding in the 1980-1983 period), but only three were actually funded because of the high cost of the modernization and the modest gains in combat capabilities that would result. The DDG-2 class ships would, therefore, provide little protection to aircraft carriers and amphibious groups in comparison with more modern ships.

Similar arguments could be made for other classes of ships whose replacements would be slowed by budget deficiencies. In each case, retention of older ships could be an expedient to avoid numerical force reductions if not erosion of combat capability relative to the threat. Indeed, as discussed in Chapter III, a tendency has developed over the past 20 years toward longer service lives for ships and aircraft as the cost for replacements has grown.

This analysis does not intend to imply that the retention of older ships and aircraft in the face of constrained procurement is unwise. Indeed, the intuitive argument that an old ship or airplane is better than none at all is almost always true. There is no absolute age at which a ship or aircraft must be retired. Such decisions should be based on many factors relating to each individual case. It is true, nevertheless, that the capabilities of ships and aircraft and their combat systems tend to erode over time relative to the threat they face and the demands that may be placed upon them. Thus a fleet that is not declining in terms of numbers may still be eroding in terms of its capabilities relative to threat it faces.

STRATEGY II -- REDUCE SUPPORT EXPENDITURES

In Strategy II, the Navy would seek to reduce the impact of budget deficiencies on its procurement programs by making relatively severe cutbacks in support expenditures. Although inconsistent with the recent statements of Navy priorities discussed above, this is clearly a policy option and might be most likely to occur if budget deficiencies were relatively modest. 4/ With substantial deficiencies, as in the zero real growth case, however, even drastic changes in operating and support practices might be inadequate to

4. Indeed, the Navy has already achieved some efficiencies in support and may be able to achieve more. These cost-savings initiatives could accommodate modest budget reductions. For example, an earlier CBO study analyzed the effects of increased "sea pay" (cash bonuses paid to those on sea duty) on the willingness of Navy personnel to accept lengthy sea duty. The study suggested that costs of added sea pay might be more than offset by reductions of personnel in shore billets designed primarily to provide shore tours for sea-weary personnel. In 1984, the Navy increased sea pay which allowed

avoid large procurement cutbacks. These changes might involve not only such things as severe reductions in operations at sea and deferral of scheduled maintenance, but also more drastic measures, for example, placing many ships in reserve status. 5/

It is unlikely that Navy leadership would elect to make such severe reductions in their operating capabilities if there were other options. Even if the support budgets were cut back to the 1980 level--a time when the fleet was smaller and support budgets were almost unanimously believed to be inadequate by both uniformed and civilian officials of the Department of the Navy--only about $186 billion of the total $250 billion difference between Case II requirements and zero real budget growth from 1986 through 1995 could be realized through reductions in the support accounts. Although this would account for a substantial part of the difference, further reductions of about $64 billion would still be necessary from investment. Moreover, reduction to the 1980 support funding level would require, among other things, a drastic 26 percent cut in the Administration's fiscal year 1986 request for support funding from $55.6 billion to about $41.0 billion. Cuts in support funding, therefore, could contribute to making up budget shortfalls, but, except in cases of relatively modest shortfalls, it is unlikely that they could carry the full burden.

STRATEGY III -- CHANGE FORCE MIX

A third strategy could be to absorb most of the budget deficiency in the investment accounts, as in Strategy I, but to mitigate the severe effect on procurement quantities by developing some less expensive alternatives to the high-cost ships, aircraft, and weapons featured in current plans. Although the less expensive units would be individually less effective in some combat situations, the option of procuring such units would provide more flexibility in dealing with funding reductions and would help avoid severe cutbacks in force levels.

As a simple illustration, suppose the Navy determined it needs to procure 40 destroyers over a 10-year period to maintain its required force

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it to reduce its needs for active-duty personnel and hence its support costs. See Congressional Budget Office, *Manpower for a 600-Ship Navy: Costs and Policy Alternatives* (August 1983).

5. For a discussion of some measures of this kind, see Congressional Budget Office, *Reducing the Deficit: Spending and Revenue Options* (February 1985), p. 95.

level. Suppose also that destroyers with all the features desired by the Navy would cost $1 billion each. If, over the 10-year period, funding for this program were reduced by 25 percent, then only 30 ships could be procured, assuming the $1 billion ship is the only option, leaving the Navy 10 ships short of its needs. If, on the other hand, there was also a design for another destroyer which did not have all of the desired features but cost only $500 million each, then the Navy could reduce the force deficiency by buying some of the less expensive units. In the case of a 25 percent reduction in funding, the Navy could procure 20 of the $1 billion dollar ships and 20 of the $500 million ships and avoid any reduction in numbers of destroyers.

The attractiveness of this approach depends upon one's assessment of the comparative effectiveness of the more and less expensive units. If one believes that the $1 billion ship, in the example above, represents the lower limit in capabilities needed for future combat, and that ships with any lesser or different capabilities could not be effective, then the best approach would be to procure as many $1 billion ships as budgets permit and accept the numerical shortfall--that is, follow Strategy I. If, on the other hand, one believes, as many do, that a large fraction of the cost of modern military systems is spent extracting a small extra margin of performance from complex technology, that many expensive features would be unneeded or even counterproductive in many combat situations, and that having enough units is probably more important than having the best units, then the alternative of procuring some lower cost units would be preferred. 6/

An illustrative example of this kind of choice is contained in the CBO report, *Building a 600-Ship Navy: Costs, Timing, and Alternative Approaches*, published in March 1982. In that report, several alternative shipbuilding programs were described. Option II was a 10-year program designed to meet the Administration's force goals, including modernization as well as more units. Another hypothetical 10-year program, Option IV, contained the same number of ships, but included less expensive types, along with fewer of the high-mix ships preferred in Navy plans. While both

6. The argument here is for lower-cost modern systems, which is qualitatively different from maintaining force levels with overage units as was discussed under Strategy I. In discusions of high-cost/high-capability ("high-mix") systems or lower-cost/lower-capability ("low-mix") systems, it is often argued that time produces today's low-mix units from yesterday's high-mix units and low-mix needs are thus automatically provided while high-mix units are the proper concern of current procurement programs. Considering the rapid advance of technology, however, that is only partly true. A new low-mix ship should have capabilities that greatly exceed those of older ships, including ones that were the best of their day. For example, today's technology should make it possible to design a low-mix anti-air missile system whose capabilities exceed those of a 30-year old system no matter how much the older system may have cost.

options would procure the same number of ships, Option IV would cost $62 billion less (in fiscal year 1983 dollars) than Option II over the 10-year period. In terms of fiscal year 1986 dollars, that would be a savings of about $72 billion, which is more than the reduction in shipbuilding that would be needed over the projected 1986 through 1995 period to accommodate zero real growth.

Lower-cost ship options suggested in the 1982 CBO study included a guided missile destroyer called DDGY, a cruiser with V/STOL aircraft, and a diesel-electric attack submarine. Because surface combatants and attack submarines account for about two-thirds of total new construction budget requirements in the 10-year period alternatives for lower unit prices in these categories can be important. The CBO believes that the illustrative examples listed above are realistic alternatives in terms of performance and cost, as extrapolated from recent design studies and costing models; they are not, however, actual designs now being developed by the Navy. If such lower-price ships are to be a true option for the Navy in the future, then fully engineered designs would have to be undertaken ahead of time. In the past, the Navy has been reluctant to develop designs for lower-price alternatives to on-going procurement programs for the stated reason that the Navy's recommended designs represent the best solutions to requirements and development of other designs is unnecessary. A further reason may be a concern that the existence of lower-cost alternatives would result in their displacing the higher-cost options during the budget review and appropriation process. It is likely, therefore, that specific Congressional direction might be necessary to induce the development of designs for lower-cost alternatives.

CONCLUSION

There are no easy answers to the problems that would be created by budget growth falling considerably short of that required to accomplish the Navy's objectives. Compromises would have to be made in force levels, readiness, or unit capability--or, especially in the case of larger budget shortfalls, all of these. Accommodating such budget deficiencies might be more efficiently accomplished by developing a strategy in advance. This is particularly true for Strategy III, in which alternative designs for less expensive ships, aircraft, and weapons must be developed in advance for such substitutions to be true options.

In view of the long periods of time and the enormous commitment of resources necessary to develop a modern Navy, naval planners and the Congress must maintain a clear view of the long-term budget realities of naval

force plans. If there is likely to be a significant difference between the funding required to realize naval force objectives and the funds actually provided, then an agreed upon strategy for dealing with such shortfalls would contribute to a clearer understanding by all concerned of the likely results of any budgetary trend.

APPENDIXES

APPENDIX A

DETAILS OF CBO'S ESTIMATES FOR THE NAVY BUDGETS, FISCAL YEARS 1985-2000

This appendix contains tables that show in detail CBO's estimates of the budgets for the Department of the Navy that would be required from fiscal year 1985 through fiscal year 2000 to achieve and sustain the Navy's current force objectives.

Three cases are considered:

- **Case I:** Assumes no real growth in procurement prices and the lowest support costs projected by the computer models used in this analysis and described in Chapter IV. This results in the minimum projected budget requirement.

- **Case II:** Assumes an average 3 percent annual real growth in procurement unit prices (typical of recent experience) and the higher of the support costs projected by the computer models used in this analysis. This produces middle-range budget projections.

- **Case III:** Assumes an average 3 percent annual real growth in unit procurement prices and support costs that remain at their recent level as a fraction of total fleet (ships plus aircraft) value rather than as a declining fraction, as both computer models suggest. The highest of the three budget projections results from these assumptions.

All budget numbers are expressed in terms of fiscal year 1986 dollars in budget authority.

TABLE A-1. NAVY BUDGET PROJECTIONS IN BUDGET AUTHORITY, FISCAL YEARS 1985-2000 (In billions of fiscal year 1986 dollars)
CASE I: DEFENSE RESOURCES MODEL AND NO REAL GROWTH IN UNIT PRICES

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Investment																
Procurement																
Aircraft	11.5	12.1	12.8	14.3	16.2	15.6	13.8	13.7	13.7	13.7	13.6	13.5	13.4	13.4	13.2	13.2
Weapons	4.5	4.8	5.0	5.2	5.3	5.3	5.4	5.6	5.8	5.8	5.6	5.6	5.5	5.6	5.6	5.4
Shipbuilding & Conversion	12.1	11.4	13.1	15.6	14.5	13.7	17.4	19.1	22.6	23.6	21.1	20.4	19.6	20.6	20.6	17.6
Marine Corps	1.9	1.3	1.4	1.5	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.5
Other	5.6	5.8	6.1	6.4	6.5	6.4	6.6	6.8	7.0	7.1	6.9	6.8	6.7	6.9	6.9	6.6
Subtotal, Procurement	35.6	35.4	38.4	43.0	44.0	42.5	44.8	46.7	50.7	51.8	48.8	47.9	46.8	48.1	47.9	44.4
Research & Development	9.7	9.9	10.4	10.9	11.1	11.0	11.3	11.6	12.1	12.1	11.8	11.7	11.5	11.8	11.8	11.3
Military Construction	1.7	1.6	1.6	1.7	1.7	1.7	1.8	1.8	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8
Subtotal, Investment	47.0	46.9	50.4	55.7	56.8	55.2	57.8	60.1	64.7	65.9	62.4	61.4	60.2	61.7	61.5	57.4
Support																
Operation & Maintenance	28.3	31.0	31.5	31.9	32.0	32.5	32.8	33.2	33.2	32.9	32.6	32.5	32.4	32.7	32.9	32.6
Military Personnel	23.8	24.0	24.3	24.7	24.9	25.3	25.5	25.7	25.8	25.8	25.8	25.9	25.9	26.2	26.3	26.1
Other	1.2	1.6	1.6	1.7	1.7	1.7	1.8	1.8	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8
Subtotal, Support	53.3	56.6	57.4	58.3	58.6	59.5	60.1	60.7	60.9	60.6	60.2	60.2	60.1	60.7	61.0	60.5
Total Budget Authority	100.3	103.4	107.9	114.0	115.4	114.8	117.9	120.8	125.6	126.5	122.7	121.6	120.3	122.4	122.5	117.9

SOURCE: Congressional Budget Office, based on Navy Department data.

TABLE A-2. NAVY BUDGET PROJECTIONS IN BUDGET AUTHORITY, FISCAL YEARS 1985-2000 (In billions of fiscal year 1986 dollars)
CASE II: RESOURCE DYNAMICS MODEL AND 3 PERCENT REAL GROWTH IN UNIT PRICES

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Investment																
Procurement																
Aircraft	11.5	12.5	13.6	15.6	18.2	18.1	16.5	16.8	17.4	17.9	18.3	18.7	19.1	19.7	20.0	20.6
Weapons	4.5	4.7	4.9	5.4	5.5	5.6	5.9	6.0	6.4	6.7	6.5	6.6	6.6	6.8	6.9	6.7
Shipbuilding & Conversion	12.1	11.7	13.9	17.0	16.3	15.9	20.8	23.5	28.6	30.8	28.4	28.2	27.9	30.3	31.2	27.4
Marine Corps	1.9	1.3	1.4	1.5	1.6	1.6	1.7	1.7	1.8	1.9	1.8	1.9	1.9	1.9	2.0	1.9
Other	5.6	5.7	6.0	6.5	6.7	6.8	7.1	7.3	7.8	8.1	7.9	8.0	8.0	8.3	8.4	8.2
Subtotal, Procurement	35.6	36.0	39.8	46.1	48.4	47.9	51.9	55.4	62.0	65.3	62.9	63.4	63.6	66.9	68.4	64.8
Research & Development	9.6	9.8	10.3	11.2	11.5	11.6	12.2	12.6	13.4	13.9	13.6	13.8	13.8	14.2	14.4	14.1
Military Construction	1.7	1.5	1.6	1.7	1.8	1.8	1.9	2.0	2.1	2.2	2.1	2.1	2.1	2.2	2.3	2.2
Subtotal, Investment	47.0	47.3	51.8	59.0	61.7	61.3	66.0	69.9	77.4	81.3	78.6	79.3	79.5	83.3	85.1	81.1
Support																
Operation & Maintenance	28.3	29.4	29.8	31.5	32.1	33.1	34.3	34.0	34.6	35.9	35.1	35.9	36.0	36.2	36.9	37.3
Military Personnel	23.8	24.1	24.3	24.3	24.5	24.8	25.0	24.9	25.1	25.2	25.6	25.9	25.9	25.9	26.1	26.0
Other	1.2	1.5	1.6	1.7	1.8	1.8	1.9	2.0	2.1	2.2	2.1	2.1	2.2	2.2	2.3	2.2
Subtotal, Support	53.3	55.0	55.7	57.6	58.4	59.7	61.2	60.9	61.7	63.2	62.8	63.9	64.0	64.3	65.3	65.5
Total Budget Authority	100.3	102.4	107.5	116.6	120.1	121.0	127.2	130.8	139.2	144.6	141.4	143.2	143.5	147.6	150.4	146.6

SOURCE: Congressional Budget Office, based on Navy Department data.

TABLE A-3. NAVY BUDGET PROJECTIONS IN BUDGET AUTHORITY, FISCAL YEARS 1985-2000 (In billions of fiscal year 1986 dollars)
CASE III: CONSTANT RATIO OF SUPPORT FLEET VALUE AND 3 PERCENT REAL GROWTH IN UNIT PRICES a/

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Investment																
Procurement																
Aircraft	11.5	12.5	13.6	15.6	18.2	18.1	16.5	16.8	17.4	17.9	18.3	18.7	19.1	19.6	20.0	20.6
Weapons	4.5	4.6	5.0	5.4	5.6	5.8	6.1	6.4	6.8	7.0	7.0	7.1	7.1	7.4	7.6	7.4
Shipbuilding & Conversion	12.1	11.7	13.9	17.0	16.3	15.9	20.8	23.5	28.6	30.8	28.4	28.2	27.9	30.3	31.2	27.4
Marine Corps	1.9	1.3	1.4	1.5	1.6	1.6	1.7	1.8	1.9	2.0	2.0	2.0	2.0	2.1	2.1	2.1
Other	5.6	5.6	6.0	6.6	6.9	7.0	7.4	7.8	8.3	8.6	8.6	8.6	8.7	9.1	9.2	9.0
Subtotal, Procurement	35.6	35.8	39.9	46.1	48.6	48.4	52.4	56.3	63.1	66.3	64.2	64.6	64.9	68.5	70.1	66.6
Research & Development	9.7	9.7	10.4	11.2	11.8	12.0	12.7	13.4	14.3	14.7	14.7	14.8	14.9	15.5	15.8	15.5
Military Construction	1.7	1.5	1.6	1.8	1.8	1.9	2.0	2.1	2.2	2.3	2.3	2.3	2.3	2.4	2.5	2.4
Subtotal, Investment	47.0	47.0	51.9	59.1	62.3	62.3	67.1	71.8	79.5	83.3	81.2	81.7	82.1	86.5	88.4	84.5
Support																
Operation & Maintenance + Military Personnel	52.1	52.3	54.5	56.2	58.6	61.1	62.9	65.2	66.7	67.6	69.3	69.7	70.6	72.9	73.9	74.6
Other	1.2	1.5	1.6	1.8	1.8	1.9	2.0	2.1	2.2	2.3	2.3	2.3	2.3	2.4	2.5	2.4
Subtotal, Support	53.3	53.8	56.1	58.0	60.4	63.0	64.9	67.3	68.9	69.9	71.6	72.0	72.9	75.4	76.4	77.0
Total Budget Authority	100.3	100.7	108.0	117.1	122.7	125.3	132.0	139.1	148.4	153.1	152.8	153.7	155.0	161.9	164.7	161.5

SOURCE: Congressional Budget Office, based on Navy Department data.

a. The assumed 3 percent annual real growth in unit prices is reflected in the procurement estimates only, not in calculating support costs.

APPENDIX B

NAVY BUDGETS AND RECENT TRENDS

The budget is not only an account of the resources available to an agency or program, but is also a barometer of trends in activities and objectives. Resources are measured by the actual amounts contained in the budget for any given period. A barometer of activities and objectives is provided by changes in those amounts from one period to another and by assignment of shares of total funds to various activities. CBO's estimates of future Navy budgets are influenced not only by force plans discussed in the body of the text but also by past budget trends that suggest areas of future need and that motivate estimating methods.

THE STRUCTURE OF THE NAVY BUDGET

The Navy budget, like that of the other armed services, is divided into various categories or accounts which, in turn, are further divided at successive levels into increasingly narrow applications. The major accounts of the Navy budget are listed in the accompanying box. Trends at or above the historical level of these budget categories are discussed in this appendix. As indicated in the box, some of these categories are commonly referred to as the investment accounts--procurement; research, development, test, and evaluation (RDT&E); and military construction. The other categories--personnel and operation and maintenance--are called the support accounts. In this discussion, all military personnel (MILPERS) accounts are combined into one total, and all operation and maintenance (O&M) accounts are similarly amalgamated.

NAVY BUDGET TRENDS

Trends in the Navy budget for fiscal years 1962 through 1986 are shown in Figure B-1. As has the entire defense budget, the Navy budget has grown substantially from fiscal year 1980 through fiscal year 1985, with a total increase of 43 percent in fiscal year 1986 dollars. The Administration proposed a further real increase of 4.5 percent--to a total of $104.9 billion --in its fiscal year 1986 budget.

BUDGET SHARES WITHIN THE DEPARTMENT OF THE NAVY

Figure B-1 also shows how the Navy budget has been allocated among various major categories--military personnel, operation and maintenance, procurement, RDT&E, and other accounts. Although the allocation of the available budget resources among these categories has been the subject of continuing debate and decisions in the budgetary process, the relative shares alloted to these various functions over the years have remained fairly stable. This is illustrated in Table B-1 in which the budget shares appropriated by the Congress in the fiscal year 1985 budget are compared with a typical share derived by calculating the average share for the previous 10 years. Over that 10-year period, the portion of the budget allocated to any given category might fluctuate by as much as two or three percentage points, but relative stability was the norm.

DEPARTMENT OF THE NAVY BUDGET CATEGORIES

Investment Accounts

APN -- Aircraft Procurement, Navy
WPN -- Weapons Procurement, Navy
SCN -- Shipbuilding and Conversion, Navy
PMC -- Procurement, Marine Corps
OPN -- Other Procurement, Navy
RDT&EN -- Research, Development, Test and Evaluation, Navy
MCON -- Military Construction, Navy

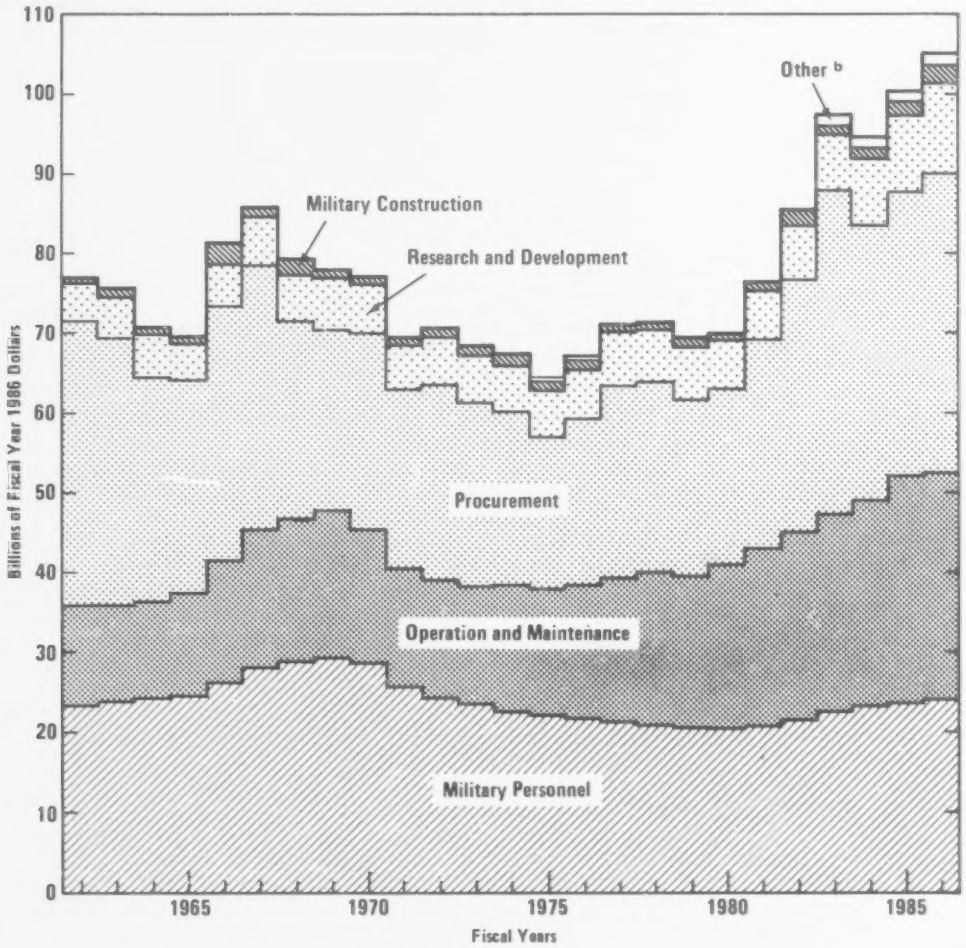
Support Accounts

MPN -- Military Personnel, Navy
RPN -- Reserve Personnel, Navy
MPMC -- Military Personnel, Marine Corps
RPMC -- Reserve Personnel, Marine Corps
O&MN -- Operation and Maintenance, Navy
O&MNR -- Operation and Maintenance, Naval Reserve
O&MMC -- Operation and Maintenance, Marine Corps
O&MMCR -- Operation and Maintenance, Marine Corps Reserve

Figure B-1.

Navy Budgets, Fiscal Years 1962-1986[a]

(Includes Adjustment for Accrual Accounting for Military Retirement)



SOURCE: Congressional Budget Office, based on data from the Department of Defense.

[a] The fiscal year 1986 budget is the Administrations request.

[b] Although "Other" expenditures appear in a number of years before 1983, the amounts are too small to display in the scale of this figure.

Investment Versus Support

The sharp increase in defense spending since fiscal year 1980 has featured a strong emphasis on procurement. For the Department of Defense (DoD) as a whole, procurement increased by 105 percent in fiscal year 1986 dollars from fiscal years 1980 through 1985, while operation and maintenance grew by only 37 percent in the same period. This has led to concern among many defense observers that support was being neglected in the rush to buy large numbers of new (and expensive) weapons--weapons that will require still

TABLE B-1. DEPARTMENT OF THE NAVY BUDGET SHARES
(By fiscal year, as a percent of the total Navy budget)

Budget Category	Average Share Fiscal Years 1975-1984 a/	Approved Budget Fiscal Year 1985 b/
Investment		
Procurement		
Aircraft procurement	10.4	12.1
Weapons procurement	4.5	4.8
Shipbuilding & conversion	13.8	13.0
Other procurement	5.5	5.9
Marine Corps procurement	1.3	2.0
Subtotal, Procurement	35.5	37.8
Military construction	1.7	1.8
Research & development	9.7	10.2
Total, Investment	46.9	49.8
Support		
Operation & maintenance	30.6	30.6
Military personnel	22.1	18.3
Other	0.4	1.3
Total, Support	53.1	50.2

SOURCE: Congressional Budget Office, based on Department of Defense data.

a. Numbers may not add to totals because of rounding.

b. Adjusted to remove retirement accrual.

higher expenditures for their continuing support in future years. There are valid reasons for support costs to lag behind procurement, but the prospect of higher support costs in the future and the ultimate amount of those costs are legitimate areas for concern.

For the Navy, the divergence between procurement and O&M has not been as marked as in the overall DoD budget. In the 1980-1985 period, procurement spending for the Navy increased 62 percent, in fiscal year 1986 dollars, while O&M funding increased by 39 percent.

A somewhat broader measure for assessing this relationship is the ratio of the investment accounts (procurement, RDT&E, and military construction) to the support accounts (operation and maintenance, military personnel, and stock funds). A plot of this ratio for the Department of the Navy for fiscal years 1962 through 1985 is displayed in Figure 8 on page 49. 1/ This ratio, which averaged about .73 during the 1970s, climbed sharply in the 1980-1983 period but has fallen back in the past two fiscal years. The investment/support ratio for the Administration's proposed Navy budget for fiscal year 1986 is .93, still well above the level of the 1970s. This suggests the importance of estimating future support costs. If one believes the ratios that prevailed in the 1970s represented a proper balance between investment and support, and if investment plans remain as projected, then support budgets should be considerably higher than projected in this study. CBO's analysis, however, indicates that such higher support budgets should not be necessary.

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1. Before fiscal year 1985, military retirement pay for all services was paid from a separate Department of Defense (DoD) budget account appropriated each year and this pay was not included within the budget of the individual services. Beginning in 1985, the budgeting system was changed to require an accrual charge each year in the military personnel account of each service to build a fund from which future retired pay disbursements of retirement pay would be made. Except where otherwise noted, all budget figures quoted in this study for fiscal years before 1985 have been adjusted to reflect what CBO estimates they would have been if the current accrual system for retirement pay had been in effect in those years. Such adjustment is necessary when comparisons are to be made for years before and after this accounting change was put into effect. Because of this adjustment, historical budget figures quoted in this study may differ from those quoted elsewhere when such an adjustment has not been made.

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